

Intent of Specifications

It is the intent of these specifications to cover the furnishing and delivery to the purchaser of a complete vehicle equipped as hereinafter specified. With a view to obtaining the best results and the most acceptable apparatus, these specifications cover minimum requirements as to the type of construction, finish, and tests to which the apparatus must conform, together with certain details as to equipment and appliances to be furnished. Minor details of construction and materials, where not otherwise specified, are left to the discretion of the contractor, who shall be solely responsible for the design and construction. The apparatus shall conform to the requirements of the current (at the time of bid) NFPA Standard for Aerial Platform apparatus to the extent as specified herein.

Qualification of Bidders

Bids will only be considered on vehicles constructed in the continental United States, whose manufacturers have an established reputation of permanency and reliability in the field of fire apparatus construction. Each manufacturer shall furnish satisfactory evidence of their ability to construct the apparatus as specified, and shall state the location of the factory where the complete apparatus will be built.

- ◆ How long has the manufacturer been building chassis at this location?

Number of years:

- ◆ How long has the manufacturer been building bodies at this location?

Number of years:

Service Requirements

It is the intent of the purchaser to assure that parts and service are readily available for the apparatus specified. SERVICE CAPABILITIES WILL BE A MAJOR CRITERIA FOR AWARD OF THIS BID. To insure proper service, no bid will be accepted unless the bidder owns or offers facilities within seventy-five (75) miles where complete parts and service are available. The facility must be staffed by full time personnel who are factory trained and EVT certified in the operation and repair of the fire apparatus with full authorization of the manufacturer. In addition, in order to ensure prompt service, the facility must be solely dedicated to the service/repair of emergency vehicles. The facility shall maintain a complete inventory including body components, electrical items, fire apparatus hardware, etc., and shall offer on-site services including pump overhaul, body fabrication, collision repair, and a paint shop complete with a cross flow booth with air makeup and bake options to insure the highest quality paint finish available. Bids from manufacturers who use third party service people or facilities, or who do not offer a service center will be immediately rejected. Furthermore, due to a concern over having vehicles "out-of-service" for extended periods of time as a result of having to be sent back to the original manufacturer's location for repairs, any bidder who cannot guarantee that all future repairs will be handled at a local level will not be acceptable.

Emergency Vehicle Technician Qualifications

Due to the highly specialized nature of fire apparatus repair, emergency vehicle technicians employed by the bidder shall be in conformance with NFPA standards 1915 and 1071. The bidder shall employ at least one (1) technician certified as a "Master Mechanic" (having amassed every EVT certification). Proof of current certification shall be supplied with the bid. There shall

be no exceptions to this requirement. Bids from organizations that do not meet these requirements shall be immediately rejected.

Service Questionnaire

The bidder shall include the following information with their bid.

- ◆ Number of miles from the purchaser to the nearest staffed service facility owned and operated by the bidder

Number of miles:

- ◆ The number of service bays and square feet of service space at the bidder's service facility.

Number of bays: Square feet:

- ◆ The length of time the service facility has been in business as an emergency vehicle dealer.

Number of years in business:

- ◆ How long has the dealer been selling the brand of emergency vehicle being proposed?

Number of years:

- ◆ Has the dealer/distributor represented other manufacturers of emergency vehicles in the past?

Yes/No

- ◆ Number of aerial platforms that have been delivered by the dealer/distributor since it has been in business representing its current "brand(s)" of emergency vehicles?

Number of aerial platforms delivered:

- ◆ Is the dealership strictly dedicated to selling and servicing emergency vehicles and equipment, or do they sell and service other products?

Strictly dedicated to emergency vehicles and equipment?

- ◆ Number of EVT Certified personnel employed? EVT "Master Mechanics"?

EVT certified personnel: EVT Master Mechanic:

- ◆ Number of full-time mechanics employed by the bidder that are solely dedicated to servicing emergency vehicles?

Number solely dedicated to emergency vehicle service:

- ◆ Full body/collision repair, fabrication, and paint booth on-site?

Yes/No

- ◆ Over \$400,000 in parts inventory available at all times?

Yes/No

- ◆ Does the local service facility accept work on other vehicles (i.e., DPW, oil, concrete, etc..) or fleet trucks in addition to emergency vehicles on a regular basis?

Yes/No

- ◆ Does the possibility exist that the emergency vehicle may have to go back to the original manufacturer's location for warranty work?

Yes/No

- ◆ Does the dealer/distributors service facility perform ALL warranty work for the products they represent?

Yes/No

Delivery

The apparatus shall be delivered under its own power to assure adequate break-in while under warranty. It shall first be transported to the local service facility, where final inspection and preparation will be performed, including mounting of related equipment. The apparatus will then be delivered to the Purchaser's location.

Post-Delivery Training

On two (2) mutually agreeable dates after delivery, a certified delivery engineer shall familiarize those persons designated by the Fire Chief with the basic operation of the apparatus and its components. Such training must be coordinated by a fire department officer with a minimum of 20 years of "hands on" experience on the fire ground. This shall be a full instructional program including both classroom and practical or "hands on" training. Limited programs or "drop-off" type deliveries are unacceptable.

Maintenance Training

A training session shall be provided to familiarize a designated person of the various service/maintenance requirements on this unit.

Construction Time

The completed apparatus shall be delivered between July 5, 2014 – August 15, 2014. This delivery date is an extremely important consideration.

Warranty

Each bidder shall submit a copy of their standard Warranty in compliance with State and Federal regulations. It shall provide coverage for a minimum of a one (1) year period. The bidder must also submit a ten (10) year body corrosion perforation warranty, a ten (10) year body limited

paint warranty, a lifetime frame warranty, a twenty (20) year aerial structural warranty, and a ten (10) year cab and body structural warranty.

Approval Drawings

A detailed drawing depicting the vehicles appearance shall be provided. The drawing shall consist of left side, right side, front, and rear elevation views.

Trade Value

A trade-in value for an E-One HP95 platform shall be provided. Please contact the Fire Chief for additional details, or the view the apparatus.

Electronic Manuals

Two (2) copies of all operator, service, and parts manuals MUST be supplied at the time of delivery in electronic format (CD-ROMs). The electronic manuals shall include the following information:

Operating Instructions, descriptions, specifications, and ratings of the cab, chassis, body, installed components, and auxiliary systems.

Warnings and cautions pertaining to the operation and maintenance of the fire apparatus and fire fighting systems.

Charts, tables, checklists, and illustrations relating to lubrication, cleaning, troubleshooting, diagnostics, and inspections.

Instructions regarding the frequency and procedure for recommended maintenance.

Maintenance instructions for the repair and replacement of installed components.

Parts Manual CD-ROM shall contain the following:

- Complete exploded view part drawings for every assemble specific to the truck. All repair components of the assembly shall be illustrated with part number assigned. This is NOT a generic parts manual.
- Mounting hardware listed on all exploded view drawings.
- Service kits and service parts listed where available.
- Recommended spare parts list.
- Reference drawings with easy to locate sub assemble page numbering.
- Warranty descriptions and coverage.

The CD-ROM shall incorporate a navigation page with electronic links to the operators manual, service manual, parts manual, and warranty information, as well as instructions on how to use the manual. Each copy shall include a table of contents with links to the specified documents or illustrations.

The CD must be formatted in such a manner as to allow not only the printing of the entire manual, but to also the cutting, pasting, or copying of individual documents to other electronic media, such as electronic mail, memos, and the like.

A find feature shall be included to allow for searches by text or by part number.

These electronic manuals shall be accessible from any computer operating system capable of supporting portable document format (PDF). Permanent copies of all pertinent data shall be kept file at both the local dealership and at the manufacturer's location.

NOTE: Engine overhaul, engine parts, transmission overhaul, and transmission parts manuals are not included.

Bumper

A heavy duty 10" high steel channel type front bumper shall be provided. The front corners of the bumper shall be angled at 45 degrees to reduce swing clearance. The bumper shall be painted job color.

Front Bumper Extension

The bumper shall be extended approximately 20" from the face of the cab as required.

Bumper Gravel Shield

The extended front bumper gravel shield shall be made of 1/8" (.125") aluminum treadplate material.

Lid, Bumper Hose Tray

The center bumper tray shall have a diamond plate lid. The lid shall be hinged and shall be secured in the closed position by a latch and held open with a pneumatic shock.

Bumper Tray - Center

A hose tray constructed of 1/8" aluminum shall be recessed into the front bumper extension. The tray shall be located in the center of the bumper and be approximately 14" deep (13" to the top of the slats). One inch thick aluminum slats shall be included in the bottom of the hose tray to aid in the dissipation of water from the tray.

Frame Rail Construction

The chassis frame shall utilize an integral torque box type design. The integral torque box shall combine the chassis frame and aerial torque box into a single structure. The integral torque box shall provide an optimized design that lowers vehicle center of gravity, eliminates the need to torque aerial frame attachment bolts, and permits under-slung outriggers to maximize body compartmentation.

The 20.5" high x 34.25" wide torque box shall be fabricated of 50,000-psi minimum yield, high strength, low alloy steel. The top and sides of the torque box frame shall be made of formed 9/16" thick plate with 1/2" bottom plates and 9/16" integral bulkhead supports. Certified welders shall construct the torque box. The design shall utilize 100% welded joints for a totally sealed box. Skip welding shall not be acceptable. Complete Finite Element Analysis and strain gauge testing shall be employed to verify minimum safety factors for road traveling (5:1) and aerial operation (2.5:1).

The completed torque box shall have the following attributes:

Resistance to bending moment 19,038,000 in. lbs.

Section modulus 380.76 cu. in.

The frame section immediately forward of the torque box shall have the following attributes:

Resistance to bending moment 4,948,000 in. lbs.

Section modulus 98.95 cu. in.

The torque box shall incorporate a stainless steel schedule 40 4" water pipe through the torque box for the aerial waterway discharge. In addition, the torque box shall have two- (2) 3" conduits full length to encapsulate the hydraulic, air and electrical lines.

The entire assembly shall be sand blasted and painted black before chassis assembly. A full lifetime warranty against defects in materials or workmanship shall be supplied by the apparatus manufacturer.

The custom chassis frame shall have a wheel alignment in order to achieve maximum vehicle road performance and to promote long tire life. The alignment shall conform to the manufacturer's internal specifications. All wheel lug nuts and axle U-bolt retainer nuts shall be tightened to the proper torque at the time of alignment. The wheel alignment documentation shall be made available at delivery upon request.

Front Axle

The vehicle shall utilize an ArvinMeritor FL-943, 5" drop beam front axle with a rated capacity of 21,500 lbs. It shall have "easy steer" knuckle pin bushings and 68.83" kingpin centers. The axle shall be of I-beam construction and utilize grease-lubricated wheel bearings. The vehicle shall have a nominal cramp angle of 45 degrees, plus two (+ 2) degrees to minus three (- 3) degrees including front suction applications.

The front axle hubs shall be made from ductile iron and shall be designed for use with 10 hole hub-piloted wheels in order to improve wheel centering and extend tire life.

The front springs shall be parabolic tapered, minimum 4" wide x 54" long (flat), minimum three (3) leaf, progressive rate with bronze bushings and a capacity of 21,500 lbs. at the ground.

Tapered leaf springs provide a 20% ride improvement over standard straight spring systems.

The vehicle shall be equipped with a Sheppard integral model M-110 power steering gear, used in conjunction with a power assist cylinder. The steering assembly shall be rated to statically steer up to a maximum front axle load of 21,500 lbs. Relief stops shall be provided to reduce system pressure upon full wheel cut. The system shall operate mechanically should the hydraulic system fail.

A 2-year/unlimited miles parts and 2-year labor axle warranty shall be provided as standard by ArvinMeritor Automotive.

In order to achieve maximum vehicle road performance and to promote long tire life, there shall be a wheel alignment. The alignment shall conform to the manufacturer's internal specifications. All wheel lug nuts and axle U-bolt retainer nuts shall be tightened to the proper torque at the time of alignment. The wheel alignment documentation shall be made available at delivery.

Shock Absorbers Front

Koni model 90 shock absorbers shall be provided for the front axle. The shocks shall be three way adjustable.

The shocks shall be covered by the manufacturer's standard warranty.

Front Axle Oil Seals

The front axle shall have Stemco oil seals with sight glass to check the lubricant level of the axle spindles.

Rear Axles

The vehicle shall utilize an ArvinMeritor RT-50-160, 54,000 lb. capacity rear tandem axle with single reduction hypoid gearing.

The axle shall be equipped with oil-lubricated wheel bearings with ArvinMeritor oil seals.

A 2-year/unlimited miles parts and 2-year labor axle warranty shall be provided as standard by ArvinMeritor Automotive.

Driver Controlled Differential

A Rockwell driver controlled main differential lock shall be supplied. Operated from within the cab, it reduces wheel spin-outs by transferring power from the slipping wheel to the wheel with traction.

When used in a tandem axle application, the DCDL will be installed on the rear/rear axle only.

Rear Suspension

The vehicle shall be equipped with a Ridewell Dynalastic rear suspension. The suspension shall consist of center trunnions, compensators, elastomer springs, and independent torque arms. Cross tubes and torque rods shall also be provided to maintain proper alignment during cornering and to absorb driving and braking forces. The suspension shall be rated for the maximum axle capacity.

A 4 year pro-rated warranty shall be provided as standard.

Front Wheels

The vehicle shall have two (2) red painted or powder coated (on outer wheel surfaces only) Alcoa aluminum disc wheels. They shall be forged from one-piece corrosion-resistant aluminum alloy and sized appropriately for the tires. Hubs and lugs shall be black

Rear Wheels

The vehicle shall have eight (8) red Alcoa aluminum disc wheels. They shall be forged from one-piece corrosion-resistant aluminum alloy and sized appropriately for the tires.

Valve Stem Extensions

Each inside rear wheel on the rear axles shall have valve stem extensions.

Front Tires

The front tires shall be two (2) Michelin 425/65R22.5 tubeless type 20 PR radial tires with XFE highway tread.

The tires with wheels shall have the following weight capacity and speed rating:
22,800 lbs. @ 65 MPH

The wheels and tires shall conform to the Tire and Rim Association requirements.

Rear Tires

The rear tires shall be Michelin 12R22.5 tubeless type radial tires with XDN2 mud and snow tread.

The tires with wheels shall have the following weight capacity:
54,000 lbs. (tandem duals) @ 75 MPH.

The wheels and tires shall conform to the Tire and Rim Association requirements.

Tire Pressure Monitor

The apparatus shall be provided with tire pressure indicating valve stem caps. The indicators shall be installed on each tire and be a heavy duty design manufactured specifically for trucks. When tire is properly inflated, the indicator inside the cap shall be green, and when the tire is underinflated by 10%, the indicator inside the cap shall be red.

Front Brakes

The front axle shall be equipped with Meritor DiscPlus EX225H 17 inch disc brakes.

The brakes shall be covered by the manufacturer's standard warranty which is three years, unlimited mileage and parts only.

Rear Brakes

The rear axles shall be equipped with Meritor DiscPlus EX225H 17 inch disc brakes with a maximum rated capacity of 54,000 lbs.

The brakes shall be covered by the manufacturer's standard warranty which is three years, unlimited mileage and parts only.

Brake System

The vehicle shall be equipped with air operated brake system. The system shall meet or exceed the design and performance requirements of current FMVSS-121 and test requirements of current NFPA 1901 Standard.

Each wheel shall have a separate integral brake chamber. A dual treadle valve shall split the braking power between the front and rear systems.

The air system shall be provided with a rapid build-up feature, designed to meet current NFPA 1901 requirements. A 1/4" brass quick-release air inlet with male connection shall be located

inside the driver door on the left side of the cab. The inlet shall allow a shoreline air hose to be connected to the vehicle, discharging into the wet tank.

A pressure protection valve shall be installed to prevent use of air horns or other air operated devices should the air system pressure drop below 80 psi.

Two (2) air pressure needle gauges, for front and rear air pressure, with warning light and buzzer shall be installed at the driver's instrument panel.

One (1) reservoir shall serve as the wet tank and a minimum of one (1) tank shall be supplied for each of the front and rear axles. The total system shall carry a sufficient volume of air to comply with FMVSS-121.

The following tank sizes shall be installed:

Tank Sizes in Cubic

Inches

Suspension	Wet	Front	Rear	Rear Extension	Total
34-54K	1738	1738	2988	0	6464
58K	1738	1738	2988	1738	8202

An automatic drain valve shall be installed on the wet tank. All other tanks shall be equipped with manual drain valves.

A Wabco ABS system shall be provided to improve vehicle stability and control by reducing wheel lock-up during braking. This braking system shall be fitted to axles and all electrical connections shall be environmentally-sealed, water-, weather-, and vibration-resistant.

The system shall constantly monitor wheel behavior during braking. Sensors on each wheel transmit wheel speed data to an electronic processor, which shall sense approaching wheel lock and instantly modulate brake pressure up to five (5) times per second to prevent wheel lock-up. Each wheel shall be individually controlled. To improve field performance, the system shall be equipped with a dual circuit design. The system circuits shall be configured in a diagonal pattern. Should a malfunction occur, that circuit shall revert to normal braking action. A warning light at the driver's instrument panel shall indicate malfunction to the operator.

The system shall consist of a sensor clip, sensor, electronic control unit, and solenoid control valve. The sensor clip shall hold the sensor in close proximity to the tooth wheel. An inductive sensor consisting of a permanent magnet with a round pole pin and coil shall produce an alternating current with a frequency proportional to wheel speed. The unit shall be sealed, corrosion-resistant and protected from electro-magnetic interference. The electronic control unit shall monitor the speed of each wheel sensor and a microcomputer shall evaluate in milliseconds wheel slip. A deviation shall be corrected by cyclical brake application and release. If a malfunction occurs, the circuit shall signal the operator and the malfunctioning half of the system shall shut down. The system is installed in a diagonal pattern for side to side control. The system shall ensure that each wheel is braked in optimum efficiency up to five (5) times a second.

The system shall also interface with the application of the auxiliary engine, exhaust, or driveline brakes to prevent wheel lock.

To improve service trouble-shooting, provisions in the system for an optional diagnostic tester shall be provided. The system shall test itself each time the vehicle is started and a dash-mounted light shall go out once the vehicle is moving above 4 MPH.

A 3 year/300,000 mile parts and labor Anti-Locking Braking System (ABS) warranty shall be provided as standard by Meritor Automotive.

Park Brake Release

One (1) Bendix-Westinghouse PP-5 parking brake control valve shall be supplied on the lower dash panel within easy reach of the driver.

Parking Brake Front Axle

A front axle parking brake system shall be provided. Utilizing a separate dash mounted activation switch, the system shall apply the front axle service brake. The system shall be interlocked to the main axle rear axle parking brake system control, so as to be operational only when the main system brakes are applied. A dash mounted warning tag shall be provided, stating; "Low air system pressure reduces or eliminates braking force."

Electronic Stability Control

The apparatus shall be equipped with a G4 6S6M Electronic Stability Control (ESC) system that combines the functions of Roll Stability Control (RSC) with the added capability of yaw - or rotational – sensing.

RSC focuses on the vehicle's center of gravity and the lateral acceleration limit or rollover threshold. When critical lateral acceleration thresholds are exceeded, RSC intervenes to regulate the vehicle's deceleration functions. The added feature of ESC is to automatically intervene to reduce the risk of the vehicle rotating while in a curve or taking evasive action, prevents drift out through selective braking, and controlling and reducing vehicle speed when lateral acceleration limits are about to be exceeded.

Intervention by the system occurs in three forms - engine, retarder and brake control. The ESC system uses several sensors to monitor the vehicle. These include a steering wheel angle sensor, lateral accelerometer, and yaw position sensor. ESC constantly monitors driving conditions and intervenes if critical lateral acceleration is detected or if the vehicle begins to spin due to low friction surfaces. The system provides control of engine and retarder torque as well as automatically controlling individual wheels to counteract both over steer and under steer.

To further improve vehicle drive characteristics, the unit shall be fitted with Automatic Traction Control (ATC). This system shall control drive wheel slip during acceleration from a resting point. An extra solenoid valve shall be added to the ABS system. The system shall control the engine and brakes to improve acceleration slip resistance. The system shall have a dash mounted light that shall come on when ATC is controlling drive wheel slip.

3 year/300,000 miles parts and labor warranties for ESC, RSC, and ATC shall be provided as standard by Meritor Automotive.

Brake System Fittings

All air brake system hoses on the chassis shall be connected by use of compression fittings. Includes air lines in the chassis cab (if equipped).

Air Dryer

The chassis air system shall be equipped with a Bendix-Westinghouse AD-9 air dryer to remove moisture from the air in order to help prevent the air lines from freezing in cold weather and prolong the life of the braking system components.

Air Inlet

A 1/4" brass quick-release air inlet with a male connection shall be provided. The inlet shall allow a shoreline air hose to be connected to the vehicle, discharging air directly into the wet tank of the air brake system. It shall be located driver door jamb.

Air Lines

Air brake lines shall be constructed of color coded nylon tubing routed in a manner to protect them from damage. Brass fittings shall be provided.

Air Horns

Dual Grover air horns shall be provided, connected to the chassis air system. The horns shall be mounted through the front bumper. The front bumper shall have two (2) holes punched to accommodate the horns. A pressure protection valve shall be installed to prevent the air brake system from being depleted of air pressure.

Transmission Selector

A T-handle shift module shall be located right side of the steering column, within easy reach of the driver. The shift position indicator shall be indirectly lit for after dark operation. The shift module shall have a "Do Not Shift" light and "Service" indicator light. The shift module shall have means to enter a diagnostic mode and display diagnostic data including oil life monitor, filter life monitor, transmission health monitor and fluid level. A transmission temperature gauge with warning light and buzzer shall be installed on the cab instrument panel.

Transmission Fluid

The transmission fluid shall be TransSynd synthetic.

Vehicle Speed

The maximum speed shall be electronically limited to 60 MPH as required by NFPA 1901.

Engine/Transmission Package

Engine

The vehicle shall utilize a Cummins ISX12 engine as described below:

- 500 Horsepower
- Six (6) cylinder
- Variable Geometry Turbocharged
- Charge Air Cooled (CAC) 4-cycle diesel
- Cummins XPI high pressure fuel injection system
- Fuel cooler (when equipped with a fire pump)
- 729 cu.in. displacement
- 500 gross BHP at 1800 RPM and a peak torque of 1645 lb.ft. at 1200 RPM with a governed RPM of 2100
- Bore and stroke shall be 5.11 x 5.91
- Compression ratio shall be 17:1
- Engine lubrication system shall have a minimum capacity, to include filter, of 43 quarts
- Cooled Exhaust Gas Recirculation (EGR)
- Delco-Remy 39 MD-HD 12 volt starter
- Interacta System
- Coolant filter with shut-off and corrosion inhibiting additive
- 18.7 cubic foot per minute air compressor
- After treatment system consisting of a oxidation catalyst and diesel particulate filter and selective catalyist reduction system
- Ember separator compliant with 2009 NFPA 1901 standard
- The engine shall be compliant with 2013 EPA Emission standards

The engine air intake shall draw air through the front cab grill. The intake opening shall be located on the officer (right) side behind front cab face with a plenum that directs air to the air filter. The air cleaner shall be a 11" diameter dry type that is easily accessed for service. Air cleaner intake piping shall be made from aluminized steel tubing with flexible rubber hoses. Air cleaner intake piping clamps shall be heavy-duty, constant-torque, T-bolt clamps to ensure

proper sealing under all temperatures in order to keep dust and other contaminants out of the engine intake air stream and protect the engine.

The engine exhaust piping shall be a minimum of 4" diameter welded aluminized steel tubing. The muffler shall be mounted horizontally under the right-hand frame rail in back of the cab in order to minimize heat transmission to the cab and its occupants. The exhaust shall be directed away from the vehicle on the right side ahead of the rear wheels in order to keep exhaust fumes as far away as possible from the cab and pump operator position.

A 5-year/100,000 miles parts and labor warranty will be provided as standard by Cummins.

A copy of the Engine Installation Review stating the engine installation meets Cummins recommendations shall be provided as requested. The engine installation shall not require the operation of any type of "power-down" feature to meet engine installation tests.

Transmission

The vehicle shall utilize an Allison EVS4000P, electronic, 5-speed automatic transmission.

A transmission oil temperature gauge with warning light and buzzer shall be installed on the cab instrument panel to warn the driver of high oil temperatures that may damage the transmission.

The transmission shall have a gross input torque rating of 1675 lb. ft. and a gross input power rating of 580 HP.

The gear ratios shall be as follows:

1 - 3.51

2 - 1.91

3 - 1.43

4 - 1.00

5 - .74

R - 4.80

The transmission shall be equipped with a fluid level sensor (FLS) system, providing direct feedback of transmission oil level information to the operator.

The transmission shall have a lubricant capacity of 51 quarts.

A water-to-oil transmission oil cooler shall be provided to ensure proper cooling of the transmission when the vehicle is stationary (no air flow).

The transmission shall contain two engine driven PTO openings located at the 1 and 8 o'clock positions. The automatic transmission shall be equipped with a power lock-up device. The transmission lock-up shall prevent down shifting of transmission when engine speed is decreased during pump operations, thereby maintaining a constant gear ratio. Transmission lock-up shall be automatically activated when placing pump in gear. Transmission lock-up shall be automatically deactivated when disengaging pump for normal road operation.

A 5-year/unlimited miles parts and labor warranty shall be provided as standard by Allison Transmission.

Jacobs Engine Brake

One (1) Jacobs engine brake shall be installed to assist in slowing and controlling the vehicle as required by NFPA 1901 for vehicles with gross vehicle weight ratings (GVWR) of 36,000 lbs. or greater. An on-off control switch and a high-medium-low selector switch shall be mounted in the cab accessible to the driver.

When activated, the Jacobs engine brake shall cut off the flow of fuel to the cylinders and alter the timing of the exhaust valves. This shall transform the engine into a high-pressure air compressor, driven by the wheels, and the horsepower absorbed by the engine in this mode shall slow the vehicle. The selector switch allows the driver to select the amount of retarding power.

When the on-off switch is in the “on” position, the engine brake shall be automatically applied whenever the accelerator is in the idle position and the automatic transmission is in the lock-up mode. If the accelerator is depressed or if the on-off switch is placed in the “off” position, the engine brake shall immediately release and allow the engine to return to its normal function.

Exhaust End Modification

The end of the exhaust tail pipe shall be modified to accommodate a Plymovent in-house exhaust extraction system. The tail pipe will be at 90 degrees and straight out below the side of body. A stop ring shall be provided on the tail pipe to properly position the Plymovent nozzle.

Engine Cooling Package

Radiator

The cooling system shall include an aluminum tube-and-fin radiator with a minimum of 1,408 total square inches of frontal area to ensure adequate cooling under all operating conditions. There shall be a drain valve in the bottom tank to allow the radiator to be serviced. A sight glass shall be included for quick fluid level assessment. The radiator shall be installed at the prescribed angle in order to achieve the maximum operational effectiveness. This shall be accomplished according to established work instructions and properly calibrated angle measurement equipment.

Silicone Hoses

All radiator and heater hoses shall be silicone. Pressure compensating band clamps shall be used to eliminate hose pinching on all hoses 3/4" diameter and larger. All radiator hoses shall be routed, loomed, and secured so as to provide maximum protection from chafing, crushing, or contact with other moving parts.

Coolant

The cooling system shall be filled with a 50/50 mixture of water and antifreeze/coolant conditioner to provide freezing protection to minus 40 (- 40) degrees F for operation in severe winter temperatures.

Coolant Recovery

There shall be a coolant overflow recovery system provided.

Charge Air Cooler System

The system shall include a charge air cooler to ensure adequate cooling of the turbocharged air for proper engine operation and maximum performance.

Charge Air Cooler Hoses

Charge air cooler hoses shall be made from high-temperature, wire-reinforced silicone to withstand the extremely high temperatures and pressures of the turbocharged air. The hoses shall incorporate a flexible hump section to allow motion and misalignment of the engine relative to the charge air cooler. Charge air cooler hose clamps shall be heavy-duty, constant-torque, T-bolt clamps to ensure proper sealing under all temperatures in order to keep dust and other contaminants out of the engine intake air stream and protect the engine.

Fan/Shroud

The fan shall be 30" in diameter with eleven (11) blades for maximum airflow and dynamic balance. It shall be made of nylon for strength and corrosion resistance. The fan shall be installed with grade 8 hardware which has been treated with thread locker for additional security. A fan shroud attached to the radiator shall be provided to prevent recirculation of engine compartment air around the fan in order to maximize the cooling airflow through the radiator. The fan shroud shall be constructed of fiber-reinforced high temperature plastic. The shroud shall be specifically formed with curved surfaces which improves air flow and cooling.

Transmission Cooler

The cooling system shall include a liquid-to-liquid transmission cooler capable of cooling the heat generated from the transmission. When a transmission retarder is selected, the cooler shall have an increased capacity to handle the additional heat load.

Fuel System

One (1) 65 gallon fuel tank shall be provided. The tank shall be of an all-welded, aluminized-steel construction with anti-surge baffles and shall conform to all applicable Administration (FHWA) 393.65 and 393.67 standards. The tank shall be mounted below the frame rails at the rear of the chassis for maximum protection. The tank shall be secured with two (2) wrap-around T-bolt type stainless steel straps. Each strap shall be fitted with protective rubber insulation and shall be secured with Grade 8 hardware. This design allows for tank removal from below the chassis.

The fuel tank shall be equipped with a 2" diameter filler neck. The filler neck shall extend to the rear of the vehicle behind the rear tires and away from the heat of the exhaust system as required by NFPA 1901 Standard for Automotive Fire Apparatus. The open end of the filler neck shall be equipped with a twist-off filler cap with a retaining chain.

The tank shall be plumbed with top-draw and top-return fuel lines in order to protect the lines from road debris. Bottom-draw and/or bottom-return fuel lines are not acceptable. A vent shall be provided at the top of the tank. The vent shall be connected to the filler neck to prevent splash-back during fueling operations. A .50" NPT drain plug shall be provided at the bottom of the tank.

The tank shall have a minimum useable capacity of 65 gallons of fuel with a sufficient additional volume to allow for thermal expansion of the fuel without overflowing the vent.

A mechanical fuel pump shall be provided and sized by the engine manufacturer as part of the engine.

Fuel Re-Prime

An auxiliary 12 volt fuel pump shall be included in the fuel system. The electric pump shall permit re-priming of the fuel lines and engine. The pump may be manually operated with a switch located accessible to driver. The electric pump shall also automatically operate in conjunction with the mechanical fuel pump as long as engine oil pressure is present. The system shall be plumbed to allow full flow to by-pass the pump.

Fuel Filter

A Fuel-Pro model 382 fuel filter shall be installed in addition to the primary fuel filter. The unit shall completely prepare fuel by removing water, thermostatically control the warming of fuel as required and effectively filter the fuel in all weather conditions.

The filter shall have the following features:

- Visual filter condition display.
- Easily disposable filter.
- High efficiency 5 micron water stripping filtration.
- Low fuel pressure drop for maximum horsepower.
- Fuel heat for low temperatures.

Fuel Shut-Off

A shut-off valve shall be supplied to prevent drain back of fuel into the main supply line during filter changes. The valve(s) shall be located: one (1) at fuel tank.

Fuel Line Hose

Wire braided fuel hose meeting SAE J-1402 shall be provided for the chassis fuel system. The hose shall have a working temperature rating of -55 degree F to 300 degree F.

The ends of the hose shall have connections that shall allow the hose to be reattached if removed.

Fuel Shut-Off

A shut-off valve shall be supplied to prevent drain back of fuel into the main supply line during filter changes. The valve(s) shall be located: one (1) inlet side of fuel/water separator.

430 Amp Alternator

There shall be a 430 amp Niehoff alternator installed as specified.

The alternator shall be a 380 amp, per NFPA 1901 rating (430 amp per SAE J56), Niehoff model C680-1 brushless type with internal rectifier. The unit shall have an adjustable remote mounted solid state voltage regulator.

The alternator also has the following features:

High Output:

Output range at typical 625 rpm engine idle meets or exceeds recommended minimum continuous load requirement identified in NFPA 1901.

Long Life Bearings:

Bearings have high temperature grease and are heat stabilized for extended service life in hot engine compartments.

Electromagnetic Interference (EMI) Suppression:

Meets SAE J1113 specifications. Will not cause interference with the vehicle's properly designed and grounded communication equipment.

Battery System

The manufacturer shall supply four (4) heavy duty Group 31 12-volt maintenance-free batteries. Each battery shall be installed and positioned so as to allow easy replacement of any single battery. Each battery shall be equipped with carrying handles to facilitate ease of removal and replacement. There shall be two (2) steel frame mounted battery boxes, one (1) on the left frame rail and one (1) on the right frame rail. Each battery box shall be secured to the frame rail with Grade 8 hardware. Each battery box shall hold (2) batteries. The batteries shall have a minimum combined rating of 4,000 (4 x 1000) cold cranking amps (CCA) @ 0 degrees Fahrenheit and 820 (4 x 205) minutes of reserve capacity for extended operation. The batteries shall have 3/8-16 threaded stud terminals to ensure tight cable connections. The battery stud terminals shall each be treated with concentrated industrial soft-seal after cable installation to promote corrosion prevention. The positive and negative battery stud terminals and the respective cables shall be clearly marked to ensure quick and mistake-proof identification.

Batteries shall be placed on non-corrosive rubber matting and secured with hold-down brackets to prevent movement, vibration, and road shock. The hold-down bracket J-hooks shall be cut to fit and shall have all sharp edges removed. The batteries shall be placed in plastic trays to provide preliminary containment should there be leakage of hazardous battery fluids. There shall be two (2) plastic trays, each containing (2) batteries. Each battery tray shall be equipped with a rubber vent hose to facilitate drainage. The rubber vent hose shall be routed to drain beneath the battery box. The batteries shall be positioned in well-ventilated areas.

One (1) positive and one (1) negative jumper stud shall be provide below the front driver side of body/pump module.

Batteries shall have a warranty of twelve (12) months that shall commence upon the date of delivery of the apparatus.

Engine Fan Clutch

The engine shall be equipped with a thermostatically controlled engine cooling fan. The fan shall be belt driven and utilize a clutch to engage when the engine reaches a specified temperature and / or the water pump is engaged (if equipped).

When disengaged, the fan clutch shall allow for improved performance from optional floor heaters, reduced cab interior noise, increased acceleration and improved fuel economy.

The fan shall be equipped with a fail safe engagement so that if the clutch fails the fan shall engage to prevent engine overheating.

Drivelines

Drivelines shall have a heavy duty metal tube and shall be equipped with Spicer 1810 series universal joints to allow full-transmitted torque to the axle(s). Drive shafts shall be axially straight, concentric with axis and dynamically balanced.

Rear Tow Eyes

Two (2) heavy duty tow eyes made of 3/4" (0.75") thick steel having 2.5" diameter holes shall be bolted directly to the rear of the frame to allow towing (not lifting) of the apparatus. The tow eyes shall be protruding into the rear compartment or out the rear of the body. The tow eyes shall be painted chassis black.

Front Two Eyes

Two (2) heavy duty painted front tow eyes shall be securely bolted to the front chassis frame rail extensions to allow towing (not lifting) of the apparatus without damage. They shall be mounted in the downward position.

Power Take-Off

Power take-off for the automatic transmission shall be a 6 bolt mounted hydraulic shift with a switch located in the cab. Hydraulic shift will allow the PTO to be shifted while the unit is in motion and without having to shut down the water pump.

DEF Tank

A diesel exhaust fluid (DEF) tank with a five (5) gallon capacity shall be provided.

The DEF tank shall include a heater fed by hot water directly from the engine block to prevent the DEF from becoming too cool to operate correctly per EPA requirements. The tank shall include a temperature sensor to control the heater control valve that controls the feed of hot water from the engine to the DEF tank heater.

A sender shall be provided in the DEF tank connected to a level gauge on the cab dash.

The tank shall be located left side below rear of cab.

Cab w/ Barrier Style Doors

The vehicle shall be distinguished by an all-welded aluminum and fully enclosed tilt cab. The cab shall be designed exclusively for fire/rescue service and shall be pre-engineered to ensure long life. It shall incorporate an integral welded substructure of high-strength aluminum alloy extrusions that creates an occupant compartment that is essentially a protective perimeter. The end result is a distinctive structure that is aesthetically appealing, functionally durable, and characterized by increased personnel safety.

The cab shall be constructed from 3/16" (0.188") 3003 H14 aluminum alloy plate roof, floor, and outer skins welded to a high-strength 6063-T6 aluminum alloy extruded subframe. Wall supports and roof bows are 6061 T6 aluminum alloy. This combination of a high-strength, welded aluminum inner structure surrounded on all sides by load-bearing, welded aluminum outer skins provides a cab that is strong, lightweight, corrosion-resistant, and durable.

The inner structure shall be designed to create an interlocking internal "roll-cage" effect by welding two (2) 3" x 3" x 0.188" wall-thickness 6063-T5 aluminum upright extrusions between

the 3" x 3" x 0.375" wall-thickness 6061-T6 roof crossbeam and the 2.25" x 3" x 0.375" wall-thickness 6063-T6 subframe structure in the front. An additional two (2) aluminum upright extrusions within the back-of-cab structure shall be welded between the rear roof perimeter extrusion and the subframe structure in the rear to complete the interlocking framework. The four (4) upright extrusions -- two (2) in the front and two (2) in the rear -- shall be designed to effectively transmit roof loads downward into the subframe structure to help protect the occupant compartment from crushing in a serious accident. All joints shall be electrically seam welded internally using aluminum alloy welding wire.

The subframe structure shall be constructed from high-strength 6061-T6 aluminum extrusions welded together to provide a structural base for the cab. It shall include a side-to-side C-channel extrusion across the front, with 3/4" x 2-3/4" (.75" x 2.75") full-width crossmember tubes spaced at critical points between the front and rear of the cab.

The cab floor shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminum plate welded to the subframe structure to give the cab additional strength and to help protect the occupants from penetration by road debris and under-ride collision impacts.

The cab roof shall be constructed from 3/16" (0.188") 3003 H14 aluminum treadplate supported by a grid of fore-aft and side-to-side aluminum extrusions to help protect the occupants from penetration by falling debris and downward-projecting objects. Molded fiberglass or other molded fiber-reinforced plastic roof materials are not acceptable.

The cab roof perimeter shall be constructed from 4" x 6-5/8" (4" x 6.625") 6063-T5 aluminum extrusions with integral drip rails. Cast aluminum corner joints shall be welded to the aluminum roof perimeter extrusions to ensure structural integrity. The roof perimeter shall be continuously welded to the cab roof plate to ensure a leak-free roof structure.

The cab rear skin shall be constructed from 3/16" (0.188") 3003 H14 aluminum plate. Structural extrusions shall be used to reinforce the rear wall.

The left-hand and right-hand cab side skins shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminum plate. The skins shall be welded to structural aluminum extrusions at the top, bottom, and sides for additional reinforcement.

The cab front skins shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminum plate. The upper portion shall form the windshield mask, and the lower portion shall form the cab front. Each front corner shall have a full 9" outer radius for strength and appearance. The left-hand and right-hand sides of the windshield mask shall be welded to the left-hand and right-hand front door frames, and the upper edge of the windshield mask shall be welded to the cab roof perimeter extrusion for reinforcement. The cab front shall be welded to the subframe C-channel extrusion below the line of the headlights to provide protection against frontal impact.

Cab Exterior

The exterior of the cab shall be 94" wide x 130" long to allow sufficient room in the occupant compartment for up to eight (8) fire fighters. The cab roof shall be approximately 101" above the ground with the flat roof option. The back-of-cab to front axle length shall be a minimum of 58". Front axle fenderette trim shall be brushed aluminum for appearance and corrosion resistance.

Bolt-in front wheel well liners shall be constructed of 3/16" (0.188") composite material to provide a maintenance-free, damage-resistant surface that helps protect the underside of the cab structure and components from stones and road debris.

A large stainless steel cooling air intake grille with an open area of no less than 81% shall be at the front of the cab.

The cab windshield shall be of a two-piece replaceable design for lowered cost of repair. The windshield shall be made from 1/4" (0.25") thick curved, laminated safety glass with a 75% light transmittance automotive tint. A combined minimum viewing area of 2,700-sq. in. shall be provided. Forward visibility to the ground for the average (50th percentile) male sitting in the driver's seat shall be no more than 11 feet 7 inches from the front of the cab to ensure good visibility in congested areas.

Cab Mounts and Cab Tilt System

The cab shall be independently mounted from the body and chassis to isolate the cab structure from stresses caused by chassis twisting and body movements. Mounting points shall consist of two (2) forward-pivoting points, one (1) on each side; two (2) intermediate rubber load-bearing cushions located midway along the length of the cab, one on each side; and two (2) combination rubber shock mounts and cab latches located at the rear of the cab, one (1) on each side.

An electric-over-hydraulic cab tilt system shall be provided to provide easy access to the engine. It shall consist of two (2) large-diameter, telescoping, hydraulic lift cylinders, one (1) on each side of the cab, with a frame-mounted electric-over-hydraulic pump for cylinder actuation. Safety flow fuses (velocity fuses) shall be provided in the hydraulic lift cylinders to prevent the raised cab from suddenly dropping in case of a burst hydraulic hose or other hydraulic failure. The safety flow fuses shall operate when the cab is in any position, not just the fully raised position.

The hydraulic pump shall have a manual override system as a backup in the event of an electrical failure. Lift controls shall be located in a compartment to the rear of the cab on the right side of the apparatus. A parking brake interlock shall be provided as a safety feature to prevent the cab from being tilted unless the parking break is set.

The entire cab shall be tilted through a 42-45 degree arc to allow for easy maintenance of the engine, transmission and engine components. A positive-engagement safety latch shall be provided to lock the cab in the full tilt position to provide additional safety for personnel working under the raised cab.

In the lowered position, the cab shall be locked down by two (2) automatic, spring-loaded cab latches at the rear of the cab. A "cab ajar" indicator light shall be provided on the instrument panel to warn the driver when the cab is not completely locked into the lowered position.

Cab Interior

The interior of the cab shall be of the open design with an ergonomically-designed driver area that provides ready access to all controls as well as a clear view of critical instrumentation.

The engine cover between the driver and the officer shall be a low-rise contoured design to provide sufficient seating and elbow room for the driver and the officer. The engine cover shall blend in smoothly with the interior dash and flooring of the cab. An all-aluminum subframe shall be provided for the engine cover for strength. The overall height of the engine enclosure shall not exceed 23" from the floor at each side and 27" in the center section. The engine cover shall not exceed 41" in width at its widest point.

The rear portion of the engine cover shall be provided with a lift-up section to provide easy access for checking transmission fluid, power steering fluid, and engine oil without raising the cab. The engine cover insulation shall consist of 3/4" dual density fiberglass composite panels with foil backing manufactured to specifically fit the engine cover without modification to eliminate "sagging" as found with foam insulation. The insulation shall meet or exceed DOT standard MVSS 302-1 and V-0 (UI subject 94 Test).

All cab floors shall be covered with a black rubber floor mat that provides an aggressive slip-resistant surface in accordance with current NFPA 1901.

A minimum of 57.25" of floor-to-ceiling height shall be provided in the front seating area of the cab and a minimum of 55.25" floor-to-ceiling height shall be provided in the rear seating area. A minimum of 36" of seated headroom at the "H" point shall be provided over each fenderwell.

The floor area in front of the front seat pedestals shall be no less than 20.5" side to side by 25.0" front to rear for the driver and no less than 20.5" side to side by 26.0" front to rear for the officer to provide adequate legroom.

Battery jumper studs shall be provided to allow jump-starting of the apparatus without having to tilt the cab.

All exposed interior metal surfaces shall be pretreated using a corrosion prevention system.

The interior of the cab shall be insulated to ensure the sound (dbA) level for the cab interior is within the limits stated in the current edition of NFPA 1901. The insulation shall consist of 2 oz. wadding and 1/4" (0.25") foam padding. The padding board shall be backed with 1/4" (0.25") thick reflective insulation. The backing shall be spun-woven polyester. Interior cab padding shall consist of a rear cab headliner, a rear wall panel, and side panels between the front and rear cab doors.

The overhead console and heater cover shall be covered with thermoformed, non-metallic, non-fiber trim pieces to provide excellent scuff and abrasion resistance, as well as chemical stain resistance. The thermoformed material shall comply with Federal Motor Vehicle Safety Standard (FMVSS) 302 for flammability of interior materials.

The vehicle shall use a seven-position tilt and telescopic steering column to accommodate various size operators. An 18" padded steering wheel with a center horn button shall be provided.

A full-width overhead console shall be mounted to the cab ceiling for placement of siren and radio heads, and for warning light switches. The console shall be made from a thermoformed, non-metallic material and shall have easily removable mounting plates.

Storage areas, with hinged access doors, shall be provided below the driver and officer seats. The driver side compartment shall be approximately 19.25" x 17.75" x 5.75" high and the officer side compartment shall be approximately 18.25" x 22.5" x 11" high (19.25" x 17.75" x 5.75" w/ air ride).

The front cab steps shall be a minimum of 8" deep x 24" wide. The first step shall be no more than 24.0" above the ground with standard tires in the unloaded condition per NFPA 1901 standards. The rear cab steps shall be a minimum 12" deep x 21" wide. The first step shall be no more than 24.0" above the ground with standard tires in the unloaded condition per NFPA 1901 standards. The rear steps shall incorporate intermediate steps for easy access to the cab. The step surfaces shall be aluminum diamond plate with a multi-directional, aggressive gripping surface incorporated into the aluminum diamond plate in accordance with current NFPA 1901.

A black rubber grip handle shall be provided on the interior of each front door below the door window to ensure proper hand holds while entering and exiting the cab. An additional black rubber grip handle shall be provided on the left and right side windshield post for additional handholds.

Cab Doors

There shall be reflective signs on each cab door in compliance with all NFPA requirements.

Four (4) side-opening cab doors shall be provided. Doors shall be constructed of a 3/16" (0.188") aluminum plate outer material with an aluminum extruded inner framework to provide a structure that is as strong as the side skins.

Front cab door openings shall be approximately 36" wide x 63" high, and the rear cab door openings shall be approximately 33.75" wide x 63" high. The front doors shall open approximately 75 degrees, and the rear doors shall open approximately 80 degrees.

The doors shall be securely fastened to the doorframes with full-length, stainless steel piano hinges, with 3/8" (0.375") diameter pins for proper door alignment, long life, and corrosion resistance. Mounting hardware shall be treated with corrosion-resistant material prior to installation. For effective sealing, an extruded rubber gasket shall be provided around the entire perimeter of all doors.

Stainless steel paddle-style door latches shall be provided on the interiors of the doors. The latches shall be designed and installed to protect against accidental or inadvertent opening as required by NFPA 1901.

The front door windows shall provide a minimum viewing area of 530 sq. in. each. The rear door windows shall provide a minimum viewing area of 500 sq. in. each. All windows shall have 75% light transmittance automotive safety tint. Full roll-down windows shall be provided for the front cab doors with worm gear drive cable operation for positive operation and long life. Scissors or gear-and-sector drives are not acceptable. Rear cab doors shall be provided with full roll down windows except when used with paddle style external door latches.

Cab Instruments and Controls

Two (2) pantograph-style windshield wipers with two (2) separate electric motors shall be provided for positive operation. Air-operated windshield wipers are not acceptable because of their tendency to accumulate moisture, which can lead to corrosion or to freezing in cold weather. The wipers shall be a wet-arm type with a one (1) gallon washer fluid reservoir, an intermittent-wipe function, and an integral wash circuit. Wiper arm length shall be approximately 28", and the blade length approximately 20". Each arm shall have a 70 degree sweep for full coverage of the windshield.

An overhead mounted heater and defroster with a minimum capacity of 60,000 Btu/hr and all necessary controls shall be mounted in the cab. The airflow system shall consist of two (2) levels, defrost and cab, and shall have fresh air and defogging capabilities.

Cab controls shall be located on the cab instrument panel in the dashboard on the driver's side where they are clearly visible and easily reachable. Emergency warning light switches shall be installed in removable panels for ease of service. The following gauges and/or controls shall be provided:

- Master battery switch/ignition switch (rocker with integral indicator)
- Starter switch/engine stop switch (rocker)
- Heater and defroster controls with illumination
- Marker light/headlight control switch with dimmer switch
- Self-canceling turn signal control with indicators
- Windshield wiper switch with intermittent control and washer control
- Master warning light switch
- Transmission oil temperature gauge
- Air filter restriction indicator
- Pump shift control with green "pump in gear" and "o.k. to pump" indicator lights
- Parking brake controls with red indicator light on dash

- Automatic transmission shift console
- Electric horn button at center of steering wheel
- Cab ajar warning light on the message center enunciator

Controls and switches shall be identified as to their function by backlit wording adjacent to each switch, or indirect panel lighting adjacent to the controls.

Fast Idle System

A fast idle system shall be provided and controlled by the cab-mounted switch. The system shall increase engine idle speed to a preset RPM for increased alternator output.

Electrical System

The cab and chassis system shall have a centrally located electrical distribution area. All electrical components shall be located such that standard operations shall not interfere with or disrupt vehicle operation. An automatic thermal-reset master circuit breaker compatible with the alternator size shall be provided. Automatic-reset circuit breakers shall be used for directional lights, cab heater, battery power, ignition, and other circuits. An access cover shall be provided for maintenance access to the electrical distribution area.

A 6 place, constantly hot, and 6 place ignition switched fuse panel and ground for customer-installed radios and chargers shall be provided at the electrical distribution area. Radio suppression shall be sufficient to allow radio equipment operation without interference.

All wiring shall be mounted in the chassis frame and protected from impact, abrasion, water, ice, and heat sources. The wiring shall be color-coded and functionally-labeled every 3" on the outer surface of the insulation for ease of identification and maintenance. The wiring harness shall conform to SAE 1127 with GXL temperature properties. Any wiring connections exposed to the outside environment shall be weather-resistant. All harnesses shall be covered in a loom that is rated at 280 degrees F to protect the wiring against heat and abrasion.

A Vehicle Data Computer (VDC) shall be supplied within the electrical system to process and distribute engine and transmission Electronic Control Module (ECM) information to chassis system gauges, the message center, and related pump panel gauges. Communication between the VDC and chassis system gauges shall be through a 4 wire multiplexed communication system to ensure accurate engine and transmission data is provided at the cab dash and pump. The VDC shall be protected against corrosion, excessive heat, vibration, and physical damage.

Two (2) dual rectangular sealed beam halogen headlights shall be installed on the front of the cab, one (1) on each side, mounted in a polished chrome-plated bezel. The low beam headlights shall activate with the release of the parking brake to provide daytime running lights (DRL) for additional vehicle conspicuity and safety. The headlight switch shall automatically override the DRL for normal low beam/high beam operation.

Cab Crashworthiness Requirement

The apparatus cab shall meet and/or exceed relevant NFPA 1901 load and impact tests required for compliance certification with the following:

Side Impact Dynamic Pre-Load per SAE J2422 (Section 5).

Testing shall meet and/or exceed defined test using 13,000 ft-lbs of force as a requirement. The cab shall be subject to a side impact representing the force seen in a roll-over. The cab shall exhibit minimal to no intrusion into the cab's occupant survival space, doors shall remain closed and cab shall remain attached to frame.

Cab testing shall be completed using 13,776 ft-lbs of force **exceeding** testing requirements.

Quasi-static Roof Strength (proof loads) per SAE J2422 (Section 6) / ECE R29, Annex 3, paragraph 5.

Testing shall meet and/or exceed defined test using 22,046 lbs of mass as a requirement. Testing shall be completed using platen(s) distributed uniformly over all bearing members of the cab roof structure.

Cab testing shall be completed using 23,561 lbs of mass **exceeding** testing requirements. The cab shall exhibit minimal to no intrusion into the cab's occupant survival space and doors shall remain closed.

Additional cab testing shall be conducted using 117,336 lbs of mass **exceeding** testing requirements by **over five (5) times**. The cab shall exhibit minimal to no intrusion into the cab's occupant survival space and the doors shall remain closed.

Frontal Impact per SAE J2420.

Testing shall meet and/or exceed defined test using 32,549 ft-lbs of force as a requirement. The cab shall be subject to a frontal impact as defined by the standard. The cab shall exhibit minimal to no intrusion into the cab's occupant survival space, doors shall remain closed and cab shall remain attached to frame.

Cab testing shall be completed using 34,844 ft-lbs of force **exceeding** testing requirements. Additional cab testing shall be conducted using 65,891 ft-lbs of force **exceeding** testing requirements by **over two (2) times**.

A copy of a certificate or letter verifying compliance to the above performance by an independent, licensed, professional engineer shall be provided upon request.

For any or all of the above tests, the cab manufacturer shall provide either photographs or video footage of the procedure upon request.

ISO Compliance

The manufacturer shall ensure that the construction of the apparatus cab shall be in conformance with the established ISO-compliant quality system. All written quality procedures and other procedures referenced within the pages of the manufacturer's Quality Manual, as well as all Work Instructions, Workmanship Standards, and Calibration Administration that directly or indirectly impacts this process shall be strictly adhered to. By virtue of its ISO compliance the manufacturer shall provide an apparatus cab that is built to exacting standards, meets the customer's expectations, and satisfies the customer's requirements.

Cab Roof Notch

The cab roof shall be notched front to rear of the cab to minimize overall travel height of the vehicle. The cab roof notch shall not affect the interior cab ceiling or cab structure.

Rear Cab Door Position

The cab rear doors shall be moved to the rear of the wheel opening. This door placement facilitates easier entry and egress by reducing the rear facing seat protrusion into the door opening.

Rear door position to the 58" or (medium cab).

Cab Door Windows

The front cab doors shall have windows similar the Rescue 6 configuration

Cab Door Locks

Each cab door shall have a manually operated door lock actuated from the interior of each respective door. Exterior of each cab door shall be provided with a barrel style keyed lock below the cab door handle.

Cab Door Locks

The cab shall have CH751 keyed door locks provided on exterior doors to secure the apparatus.

Cab Door Front Windows

The front door cab windows shall be electrically controlled. Each window shall have a switch on the door to control operation. The driver door shall have a switch panel to control each door window individually.

Cab Door Rear Windows

The rear cab door windows shall be electrically controlled. Each window shall have a switch on the door to control operation.

Cab Door Panels

The inner door panels shall be made from 14 gauge brushed finish stainless steel for increased durability. The cab door panels shall incorporate an easily removable panel for access to the latching mechanism for maintenance or service.

Cab Door Exterior Latches

All cab doors shall have "L" style exterior door latches.

Cab Door Area Lighting

There shall be four (4) clear LED lights provided to illuminate the cab step well area. Each light shall be located in the cab step well area. Each light shall be activated by the cab door ajar circuit.

Cab Door Reflective Material

Reflective Red/Lemon Yellow material striping shall be supplied on each of the lower cab doors. The stripes shall be be angled from the lower outer corner to the upper inside corner, forming an "A" shape when viewed from the rear. The reflective material shall be at least 96 square inches to meet NFPA 1901 requirements.

Cab Steps

A step below each cab door shall be provided. The step shall be constructed of .188" aluminum tread brite. The step surface shall be provided with an aggressive skid-resistant surface. The step shall be in accordance with current NFPA requirements and shall include a multi-directional aggressive gripping surface incorporated into the diamond plate. The surface shall extend vertically from the diamond plate sheet a minimum of 1/8" (0.125"). Gripping surfaces shall be circular in design, a minimum of 1" diameter and on centers not to exceed 4". It shall be located driver's front door, officer's front door, driver's rear door, officer's rear door. Steps under front cab doors shall not interfere with approach angle.

Cab Mirrors

Mirror Stainless Steel 8" Convex, bell type mounting, (2) piece adjustable telescoping arm head #983, arm #3983. Mirror shall be mounted horizontally above the officer's position to permit rapid viewing of the rear cab area.

Mirrors, Heated

The cab mirrors shall be heated.

Cab Mirrors

Two (2) Ramco model 6001FFR remote controlled aluminum mirrors shall be installed. The mirrors shall incorporate a full face main section with a convex mirror with housing model CAS750, mounted to the top. The adjustment of main sections shall be through dash mounted switches. Location: mounted on front corners of cab.

Cab Canopy Window

There shall be a fixed window provided between the front and rear doors on the driver's side of the cab.

Window dimensions shall be as follows:

- 44" C/A cab (short cab): 16"W x 24.5"H
- 58" - 80" C/A cab (medium - extended): 26.69"W x 24.5"H

Cab Canopy Window

There shall be a fixed window provided between the front and rear doors on the officer's side of the cab.

Window dimensions shall be as follows:

- 44" C/A cab (short cab): 16"W x 24.5"H
- 58" - 80" C/A cab (medium - extended): 26.69"W x 24.5"H

Front Mud Flaps

Black linear low density polyethylene (proprietary blend) mud flaps shall be installed on the rear of the cab front wheel wells. The design of the mud flaps shall have corrugated ridges to distribute water evenly.

Handrails

Cab door assist handrails shall consist of two (2) 1.25" diameter x 18" long 6063-T5 anodized aluminum tubes mounted directly behind the driver and officer door openings one each side of the cab. The handrails shall be machine extruded with integral ribbed surfaces to assure a good grip for personnel safety. Handrails shall be installed between chrome end stanchions and shall be positioned at least 2" from the mounting surface to allow a positive grip with a gloved hand.

Handrails

Cab door assist handrails shall consist of two (2) 1.25" diameter x 18" long 6063-T5 anodized aluminum tubes mounted directly behind the driver and officer rear door openings each side of the cab. The handrails shall be machine extruded with integral ribbed surfaces to assure a good grip for personnel safety. Handrails shall be installed between chrome end stanchions and shall be positioned at least 2" from the mounting surface to allow a positive grip with a gloved hand.

Rear Cab Wall Construction

The rear cab wall shall be constructed with the use of 3/16" aluminum diamond plate interlocking in aluminum extrusions.

Air Conditioning

An overhead air-conditioner / heater system with a single roof mounted condenser shall be supplied.

The unit shall be mounted to the cab interior headliner in a mid cab position, away from all seating positions. The unit shall provide ten (10) comfort discharge louvers, four (4) to the back area of the cab and six (6) to the front. These louvers will be used for AC and heat air delivery. Two (2) additional large front louvers shall be damper controlled to provide defogging and defrosting capabilities to the front windshield as necessary.

The unit shall consist of a high output evaporator coil and heater core with one (1) high output dual blower for front air delivery, and two (2) high performance single wheel blowers for rear air delivery.

A serviceable filter shall be installed on the A/C evaporator. The filter shall consist of a steel perimeter frame with a foam filter.

The control panel shall actuate the air-distribution system with air cylinders, which are to be separated from the brake system by an 85-90 psi pressure protection valve. A three-speed blower switch shall control air speed.

The condenser shall be roof mounted and have a minimum capacity of 65,000 BTU's and have dual fans with a built in receiver drier.

Performance Data: (Unit only, no ducting or louvers)

AC BTU: 55,000

Heat BTU: 65,000

CFM : 1300 @ 13.8V (All blowers)

The compressor shall be a ten-cylinder swash plate type Seltec model TM-31HD with a capacity of 19.1 cu.in. per revolution.

The system shall be capable of cooling the interior of the cab from 100 degrees ambient to 75 degrees or less with 50% relative humidity in 30 minutes or less.

Cab Seats

All cab seats shall be Bostrom brand.

Seat, Driver

One (1) H. O. Bostrom 400 Series Sierra Air- 100RX4 suspension seats with high back styling shall be supplied for the driver position.

Features shall include:

- Air-100 suspension assembly with weight, height and ride adjustment.
- Built in lumbar support.
- 4" vertical suspension motion.
- 5" fore and aft adjustment.

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

Seat, Officer

One (1) Bostrom 400 Series tanker 450 SCBA air suspension seat shall be supplied for the officer's position.

Features shall include:

- Removable "Store-All" side cushions.
- Auto-pivot and return headrest to open for improved exit with SCBA.
- 12.5" wide SCBA cavity to store leading SCBA Brands.
- Built in lumbar support.
- Replaceable seat, side and headrest cushions.
- Adjustable depth shroud: 28" - 29.5" depth
- Adjustment 5" fore and aft

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

Seat, Rear Facing

One (1) Bostrom 400 Series tanker 450 SCBA high back SCBA storage seat shall be provided in the rear facing position over the driver side wheel well.

Features shall include:

- Removable "Store-All" side cushions.
- Auto-pivot and return headrest to open for improved exit with SCBA.
- 12.5" wide SCBA cavity to store leading SCBA Brands.
- Built in lumbar support.
- Replaceable seat, side and headrest cushions.

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

Seat, Rear Facing

One (1) Bostrom 400 Series tanker 450 SCBA high back SCBA storage seats shall be provided in the rear facing position over the officer side wheel well.

Features shall include:

- Removable "Store-All" side cushions.
- Auto-pivot and return headrest to open for improved exit with SCBA.
- 12.5" wide SCBA cavity to store leading SCBA Brands.
- Built in lumbar support.
- Replaceable seat, side and headrest cushions.

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

Seat Cover Material

All seats shall have Durawear seat cover material.

Seat Fabric Color

All seats shall be gray in color.

Seating Capacity Tag

A tag that is in view of the driver stating seating capacity of six (6) personnel shall be provided.

Seat, Rear Wall

Two (2) Bostrom SCBA backs and a two (2) person bench style seat with a single bottom cushion shall be mounted on an aluminum seat riser or the rear wall of the cab. Each side of the seat riser shall be angled, providing sufficient legroom when entering and exiting the cab.

Features shall include:

- Removable "Store-All" side cushions.
- Auto-pivot and return headrest to open for improved exit with SCBA.
- 12.5" wide SCBA cavity to store leading SCBA brands.
- Built-in lumbar support.
- Replaceable seat, side and headrest cushions.

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

Bostrom SecureAll Locking System

The H.O. Bostrom SecureAll™ SCBA Locking System shall be one bracket model and store all U.S. and international SCBA brands and sizes while in transit or for storage on fire trucks. The bracket shall be easily adjustable; all adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

The bracket system shall be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the tank in-place for a safe and comfortable fit in seat cavity. Firefighters shall simply push the SCBA unit against the pivot arm

to engage the patented auto-locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions.

The SecureAll™ bracket shall fit in all H.O. Bostrom Tanker SCBA seats including ABTS and non-ABTS seats and all flip-up ABTS and non-ABTS seats. Additional seat depth shall not be required for proper bracket fit; changes to the shroud back shall not be required for proper mounting of the bracket.

The standard release handle shall be integrated into the seat cushion for quick and easy release and shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

The H.O. Bostrom SecureAll™ system meets NFPA 1901 standards and requirements of EN 1846-2.

Location: officer's seat, rear facing driver's side, rear facing officer's side. The bracket(s) shall be located officer's seat, rear facing driver's side, rear facing officer's side.

Map Box Location

The map box suspended between the 3x3 vertical uprights shall be offset to the rear of the 3x3's. The map box shall be mounted down low as possible as space permits.

Map Box

An aluminum map/storage box shall be installed in the cab. The map box shall be constructed of 1/8" (.125) inch smooth aluminum. Hinged drop-down doors with push button latches, shall be installed on the front of the box for the access to the driver and officer side storage areas. Each storage area shall have two (2) fixed shelves for storage of ring binders, map books, etc. Each latch shall have a 50 lb. rating.

The map box shall be mounted on the vertical uprights in the center of the cab between the driver and officer seating positions. The map box shall be secured and tested to meet with current NFPA requirements.

Approximate overall dimension: 34" W x 9.50" H x 12" D.

Map Box Finish

The map box(es) shall have Zolatone gray 20-64 finish.

Cab Floor Clearance Box

The rear cab floor shall be modified to provide clearance for the power take off and hydraulic pump. The top of the box shall be covered with rubber floor matting to match the rest of the cab.

Cab Interior Color

Cab instrument panel, overhead console, trim panels, headliner, and door panels shall be gray.

Sun Visors

Lexan sun visors shall be provided for the driver and officer matching the interior trim of the cab and shall be flush mounted into the underside of the overhead console.

Air Horn Lanyard

There shall be a "Y" style lanyard mounted in the center of the cab that allows the driver and officer to operate the air horns. The lanyard shall activate an electrical air switch.

Cab Dash - Severe Duty

The center and officer side dash shall be constructed from .125" smooth aluminum plate painted to match the cab interior. A hinged access panel shall be provided on top of the center dash to provide easy access to components within.

The lower kick panels below the dash to be constructed from .125" aluminum diamond plate. The panels shall be removable to allow for servicing components that may be located behind the panels.

Trim, Rear Engine Cover

The rear portion of the engine cover shall have an overlay of aluminum diamond plate installed to provide additional wear resistance.

Engine Cover

The engine cover shall blend in smoothly with the interior dash and flooring of the cab. The upper left and right sides shall have a sloped transition surface running front to rear providing increased space for the driver and officer.

The engine cover and engine service access door cover shall be molded 18 lb/cu. ft. (+/-0.5) flexible integral skinned polyurethane foam at a Durometer of 60 (+/- 5.0) per ASTM F1957-99 and with a minimum skin thickness of 0.0625 inches and shall be provided to reduce the transmission noise and heat from the engine. The cover shall be black and feature a pebble grain finish for slip resistance.

Cup Holders

Two (2) cup holders shall be provided on the cab engine cover. The cup holders shall be molded 18 lb/cu. ft. (+/-0.5) flexible integral skinned polyurethane foam at a Durometer of 60 (+/- 5.0) per ASTM F1957-99 and with a minimum skin thickness of 0.0625 inches. The outer surface of the cup holders shall be black with a pebble grain finish and shall include a removable plastic liner.

The cup holders shall be located Driver and officer side of engine cover slightly ahead of access door spaced approximately 20" apart (center to center).

Cab Door Warning Lights

One (1) Whelen model PSR00FRR LED red flashing strip light shall be provided on each interior cab door panel. The lights shall be horizontally mounted on the lower kick panels and wired through each door switch.

Cab Interior ceiling lights

A Weldon LED dome light assembly with one (1) white lens and one (1) red lens and plastic housing shall be installed. The red light activates with appropriate cab door and light assembly switch, the red light activates with light assembly mounted switch only.

There shall be two (2) mounted in the front of the cab, one (1) in the driver and one (1) in the officer ceiling.

There shall be two (2) mounted in the rear of the cab, one (1) in the driver side and one (1) in the officer side ceiling.

Auto-Eject Battery Charger Receptacle

The battery charger receptacle shall be a Kussmaul 20 amp NEMA 5-20 Super Auto-Eject #091-55-20-120 with a cover. The Super Auto-Eject receptacle shall be completely sealed and have an automatic power line disconnect.

The receptacle shall be located outside driver's door next to handrail and the cover color shall be Red.

Horn Button Switch

A two (2) position rocker switch shall be installed in the cab accessible to the driver and properly labeled to enable operator to activate the OEM traffic horn or air horn from the steering wheel horn button.

Auto Transfer Switch

An automatic transfer switch shall be installed to allow all interior household type receptacles to be powered either by the shore power receptacle or the on-board generator.

The system shall include an eight (8) place breaker box for the interior receptacles.

ATC Override

An Automatic Traction Control (ATC) override switch shall be provided. The switch shall be located within reach of the driver and allow for momentary disabling of the ATC system due to mud or snow conditions.

DPF Regeneration Override

An override switch shall be provided for the Diesel Particulate Filter (DPF) regeneration. The switch will inhibit the regeneration process until the switch is reset or the engine is shut down and restarted. The switch shall be located within reach of the driver.

English Dominant Gauge Cluster

The cab operational instruments shall be located in the dashboard on the driver side of the cab and shall be clearly visible. The gauges in this panel shall be English dominant and shall be the following:

- Speedometer/Odometer
- Tachometer with integral hour meter
- Engine oil pressure gauge with warning light and buzzer
- Engine water temperature gauge with warning light and buzzer
- Two (2) air pressure gauges with a warning light and buzzer (front air and rear air)
- Fuel gauge
- Voltmeter
- Transmission oil temperature gauge

This panel shall be backlit for increased visibility during day and night time operations.

Cab Turn Signals

There shall be a pair of Whelen 600 LED (Light Emitting Diode) turn signal light heads with populated arrow pattern and amber lens mounted upper headlight bezel and wired with weatherproof connectors.

Headlights

The front of the cab shall have four (4) headlights. The headlights shall be mounted on the front of the cab in the lower position. The headlights shall be day time operational.

Battery Charger/Air Compressor

A Kussmaul Auto-Charge 1200 battery charger and air compressor with automatic battery charger shall be installed.

The battery charger shall be completely automatic with an output of 0-40 amps @ 12 volts DC and an input current requirement of 10 amps @ 120 volts AC.

A Kussmaul air compressor with automatic battery conditioner model 091-9-1200 shall be installed. The battery conditioner is completely automatic with a 0-40 amp output to maintain the charge in the battery system. The air compressor shall be powered by a 12 volt DC output from the battery charger and has an output of .30 cfm at 80 PSI. A pressure switch senses the system pressure and operates the compressor whenever the pressure in the air brake system drops below a pre-determined level.

Battery Saver

A Kussmaul 091-195-12 Battery Saver shall be installed.

The battery saver shall provide 20 amps of DC output for 12 volt accessories. The unit shall be equipped with an automatic transfer relay to return loads to the chassis batteries when the 120 VAC power is disconnected.

The unit shall have a three year warranty.

Cornering light Circuit

There shall be a circuit to activate the reverse light at the rear tandems when the directional are activated

Cab 12 Volt (or 24 Volt) Outlet [Qty: 2]

A plug-in type receptacle for hand held spotlights, cell phones, chargers, etc. shall be installed officer side dash. The receptacle shall be wired battery hot.

Antenna Bases

There shall be a Tessco P/N 90942 universal antenna base mounted on the cab roof with a weatherproof connector. The antenna base shall be NMO Motorola Style (equivalent to a MATM style). The antenna shall be located driver side forward with coaxial cable terminating at the center of the dash board, driver side rearward with coaxial cable terminating at the center of the dash board, officer side forward with coaxial cable terminating at the center of the dash board, officer side rearward with coaxial cable terminating at the center of the dash board.

Battery Charger Location

The battery charger shall be located behind driver's seat.

Air Compressor Location

The air compressor shall be located behind driver's seat.

Aerial Body

Performance

The apparatus body shall be constructed entirely of aluminum extrusions with interlocking aluminum plates. An extruded modular aluminum body is required due to the high strength-to-weight ratio of aluminum, corrosion-resistant body structure, easy damage repair, and lighter overall body weight to allow for increased equipment carrying capacity.

The apparatus shall incorporate a rescue style body design to maximize compartment space. The rescue style left and right side body shall combine upper and lower compartments to provide more efficient use of body storage capacity. The body design shall provide 388.77 cubic feet of storage, which exceeds the minimum NFPA 1901 Chapter 8.5 requirement of 40 cubic feet.

The entire vehicle shall be constructed of aluminum extrusions. Body designs that incorporate steel sub-frames connected to aluminum compartments are not as corrosion-resistant and not acceptable.

Body Mainframe

The body mainframe shall be entirely constructed of aluminum. The complete framework shall be constructed of 6061T6 and 6063T5 aluminum alloy extrusions welded together using 5356 aluminum alloy welding wire.

The mainframe shall incorporate a series of vertical frame components connected in series. Each vertical frame assembly shall be constructed with 3" x 3" extrusions welded together in a square frame configuration. The open center shall permit the installation of a tunnel for ground ladder storage. The mainframe shall be held together from front to rear by two (2) solid 1/2" x 3" aluminum braces on each side of the vertical frame components. The braces shall also serve as the connection point between the torque box and body frame. The body side compartments shall be connected and supported by the extruded aluminum mainframe assembly.

Body Side Assemblies

The left and right side body assemblies shall be framed with 6063T5 1 1/2" x 4" 3/16" wall extrusions. The body compartments shall be framed to make full height compartments ahead and behind the wheel well opening. The body side assemblies shall be designed so that the compartment walls are not required to support the body. The compartments shall be interlocked and welded to the side assembly extrusions.

The top of the body side assemblies shall be supplied with embossed diamond plate covers with polished corners to minimize maintenance and provide service access to electrical components.

Stabilizer Openings

The body shall be designed to accommodate a four (4) stabilizer aerial system. One (1) opening shall be supplied behind the rear axle as close to the wheel well opening as possible to maximize rear angle of departure and to prevent the stabilizer pads from contacting the ground during driving. The second set shall be mounted just behind the transverse compartment. The openings shall be framed in aluminum extrusions. A stabilizer cover shall be supplied on the extendable stabilizer. The cover shall provide a pleasing appearance and mounting location for a red stabilizer warning light as outlined in NFPA 1901.

The stabilizer openings shall be supplied with clear lights to illuminate the stabilizers and the ground surrounding the openings. The lights shall illuminate when any stabilizer is moved from the stored position.

Body Mounting System

The body shall attach to the integral torque box with grade 8 bolts connected through steel mounts welded on the side of the torque box. To isolate dissimilar metals a 1/4" fiber-reinforced rubber dielectric barrier between the aluminum body and steel torque box shall be supplied.

Body designs that weld to the aerial torque box or chassis frame rails shall not be acceptable due to the stress imposed on the vehicle during road travel and aerial operations.

Rear Body Design

The rear body shall be designed to provide ground ladder storage, hose deployment, and service access to aerial components. The center rear of the body shall be open for ground ladder storage. The area below the ground ladder storage shall be for a waterway inlet, the stabilizer control panel and have access doors to hydraulic components.

The aerial master control panel that is located on the rear of the body shall consist of a master switch, interlock light, and indicators that illuminate when each stabilizer is deployed. The stabilizer controls shall be divided into two (2) boxes located one (1) each side on the rear body so the operator may observe the stabilizers being deployed on each side of the apparatus as outlined in NFPA 1901.

Side Aerial Access Staircase

Two (2) access staircases to the aerial ladder turntable shall be supplied. One (1) on the driver's rear side and one (1) on the passenger rear side of the apparatus. Each staircase shall incorporate a pocket-style drop-down step in the body to reduce the ground-to-staircase step height when the unit is supported on the stabilizers. Each angled staircase shall be supplied with extruded aluminum handrails on both sides of the staircase frame.

Access steps shall be mounted in accordance with current NFPA requirements, and shall not exceed a maximum stepping height of 18". The steps shall be a minimum of 4" deep x 15" wide. The top surface of the steps shall have a minimum of 35 sq. in. and shall have a slip-resistant surface. Access steps shall be able to support up to 500 pounds. Steps shall be located to provide a minimum of 8" clearance between the leading edge of the step and any obstruction.

Body Top

The top of the body between the side compartments shall be an open storage area approximately 38" wide x 14-1/2" deep and 87" long. This area shall be framed with 3"x3" 3/16" wall extrusions. The floor shall be 1/8" embossed diamond plate supported by the body mainframe extrusions. The body top shall have an access hole for aerial hydraulic oil fill and check.

Compartments

All body compartment walls and ceilings shall be constructed from 1/8" formed aluminum 3003 H14 alloy plate. Each compartment shall be modular in design and shall not be part of the body support structure.

Compartment floors shall be constructed of 1/8" aluminum diamond plate welded in place.

Compartment floors that are over 15" deep shall be supported by a minimum 1.5" x 3" x 1/8" walled aluminum extrusions. The compartment seams shall be sealed using a permanent pliable silicone caulk. A series of louvers shall be supplied to facilitate ventilation of each compartment. Each louver shall be 3" wide by 3/4" tall and 1/2" deep.

Compartment Sizes

The approximate compartment sizes and locations shall be as follows:

There shall be one (1) transverse compartment (L1/R1) ahead of the forward stabilizers. The compartment shall be approximately 42.5" wide x 43" high x 94.5" deep (upper) (transverse) and 42.5" wide x 26" high x 22.5" deep (lower) (each side) and contain approximately 128.72 cubic feet of storage space. The door opening shall be approximately 42.5" wide x 69" high.

Left Side:

There shall be one (1) compartment (L2) over the forward stabilizers. The compartment shall be approximately 31" wide x 28" high x 26" deep (upper) and 31" wide x 29" high x 14" deep (lower) and contain approximately 20.34 cubic feet of storage space. The door opening shall be approximately 31" wide x 57" high.

There shall be one (1) compartment (L3) behind the forward stabilizers. The compartment shall be approximately 48" wide x 69" high x 25.5" deep and contain approximately 48.88 cubic feet of storage space. The door opening shall be approximately 48" wide x 69" high.

There shall be one (1) compartment (L4) over the rear wheels. The compartment shall be approximately 50.5" wide x 20" high x 26" deep and contain approximately 15.20 cubic feet of storage space. The door opening shall be approximately 50.5" wide x 20" high.

There shall be one (1) compartment (L5) over the rear wheels. The compartment shall be approximately 52.5" wide x 20" high x 20" deep and contain approximately 12.15 cubic feet of storage space. The door opening shall be approximately 52.5" wide x 20" high.

There shall be one (1) compartment (L6) over the rear stabilizer. The compartment shall be approximately 50.5" wide x 15" high x 18" deep (upper), 19.25" wide x 27.5" high x 23" deep (lower forward), 31.25" wide x 27.5" high x 14" deep (lower rearward) and contain approximately 21.9 cubic feet of storage space. The door opening shall be approximately 50.5" wide x 42.5" high.

There shall be one (1) compartment (L7) behind the rear stabilizer. The compartment shall be approximately 15" wide x 15" high x 18" deep (upper) and 15" wide x 35.5" high x 23" deep (lower) and contain approximately 9.43 cubic feet of storage space. The door opening shall be approximately 15" wide x 50.5" high.

There shall be one (1) compartment (L8) down low ahead of the rear stabilizer with a horizontally-hinged single pan door constructed of the same material / finish as the body wheelwells. The compartment shall be approximately 15.5" wide x 8" high x 23" deep and

contain approximately 1.65 cubic feet of storage space. The door opening shall be approximately 15.5" wide x 8" high.

Right Side:

There shall be one (1) compartment (R2) over the forward stabilizers. The compartment shall be approximately 31" wide x 28" high x 26" deep (upper) and 31" wide x 29" high x 14" deep (lower) and contain approximately 20.34 cubic feet of storage space. The door opening shall be approximately 31" wide x 57" high.

There shall be one (1) compartment (R3) behind the forward stabilizers. The compartment shall be approximately 48" wide x 69" high x 26" deep and contain approximately 49.83 cubic feet of storage space. The door opening shall be approximately 48" wide x 69" high.

There shall be one (1) compartment (R4) over the rear wheels. The compartment shall be approximately 50.5" wide x 20" high x 26" deep and contain approximately 15.20 cubic feet of storage space. The door opening shall be approximately 50.5" wide x 20" high.

There shall be one (1) compartment (R5) over the rear wheels. The compartment shall be approximately 52.5" wide x 20" high x 20" deep and contain approximately 12.15 cubic feet of storage space. The door opening shall be approximately 52.5" wide x 20" high.

There shall be one (1) compartment (R6) over the rear stabilizer. The compartment shall be approximately 50.5" wide x 15" high x 18" deep (upper), 19.25" wide x 27.5" high x 23" deep (lower forward), 31.25" wide x 27.5" high x 14" deep (lower rearward) and contain approximately 21.9 cubic feet of storage space. The door opening shall be approximately 50.5" wide x 42.5" high.

There shall be one (1) compartment (R7) behind the rear stabilizer. The compartment shall be approximately 15" wide x 15" high x 18" deep (upper) and 15" wide x 35.5" high x 23" deep (lower) and contain approximately 9.43 cubic feet of storage space. The door opening shall be approximately 15" wide x 50.5" high.

There shall be one (1) compartment (R8) down low ahead of the rear stabilizer with a horizontally-hinged single pan door constructed of the same material / finish as the body wheelwells. The compartment shall be approximately 15.5" wide x 8" high x 23" deep and contain approximately 1.65 cubic feet of storage space. The door opening shall be approximately 15.5" wide x 8" high.

Handrails

Access handrails shall be provided at all step positions, including, but not limited to, the rear turntable access stair cases and installed to NFPA 1901 15.8. All body handrails shall be constructed of maintenance-free, corrosion-resistant, extruded aluminum. Handrails shall be a minimum of 1.25" OD and shall be installed between chrome end stanchions at least 2" from the mounting surface to allow for access with a gloved hand. The extruded aluminum shall be ribbed to assure a good grip for personnel safety.

The handrails shall be installed as follows:

- Four (4) 48" handrails, two (2) each side, located on the aerial access stair cases.

Steps, Standing, and Walking Surfaces

The maximum stepping distance shall not exceed 18", with the exception of the ground to first step. The ground to first step shall not exceed 24". The ground to first step shall be maintained when the stabilizers are deployed by an auxiliary set of steps installed at the aerial access staircases. All steps or ladders shall sustain a minimum static load of 500 lbs. without deformation as outlined in NFPA 15.7.2.

All exterior steps shall be designed with an average slip resistance of .68 when wet as measured with an English XL tester following ASTM F 1679 (Standard Test Method for Using a Variable Incidence Tribometer).

Apparatus Warning Labels

A label shall be supplied on the rear body to warn personnel that riding in or on the rear step is prohibited as outlined in NFPA 1901 15.7.5. A label shall be applied to both sides of the apparatus and the rear to warn operators that the aerial is not insulated.

Rubrail

The body shall have a rubrail along the length of the body on each side and at the rear. The rubrail shall be constructed of minimum 3/16" thick anodized aluminum 6463T6 extrusion. The rubrail shall be a minimum of 2.75" high x 1.25" deep and shall extend beyond the body width to protect compartment doors and the body side.

The rubrail shall be of a C-channel design to allow marker and warning lights to be recessed inside for protection. The top surface of the rubrail shall have a minimum of five (5) serrations raised .1" high with cross grooves to provide a slip-resistant edge for the rear step and running boards. The rubrail shall be spaced away from the body using 3/16" nylon spacers. The ends of each section shall be provided with a rounded corner piece. The area inside the rubrail C-channel shall be inset with a reflective material for increased side and rear visibility.

ISO Compliance

The manufacturer shall ensure that the construction of the apparatus aerial body shall be in conformance with the established ISO-compliant quality system. All written quality procedures and other procedures referenced within the pages of the manufacturer's Quality Manual, as well as all Work Instructions, Workmanship Standards, and Calibration Administration that directly or indirectly impacts this process shall be strictly adhered to. By virtue of its ISO compliance the manufacturer shall provide an apparatus aerial device that is built to exacting standards, meets the customer's expectations, and satisfies the customer's requirements.

Rear Body Platework

The rear body platework shall be flush mounted 3/16" aluminum smooth plate painted job color.

Auxiliary Ground Pads

Four (4) auxiliary ground pads shall be provided. The pads shall be 26" x 26" x 1/2" thick aluminum plate with a grab handle welded to the edge. The pads shall be stored in double brackets that are mounted each side below the body ahead of the rear wheels.

Outrigger Covers

Two (2) piece outrigger covers constructed of .125" aluminum tread plate shall be provided for the jack leg openings. One piece of the cover shall be sized to cover just the extending outrigger in order to require a minimal amount of set-up space. The second piece of the cover shall be fixed and mounted to the body to cover the remaining outrigger opening.

Transverse Compartment Floor

The L1/R1 transverse compartment floors shall be extended out to the door openings.

Rear Pike Pole Storage

Pike poles storage shall be provided at the rear of the body for six (6) pike poles. The storage area shall be labeled for two (2) 6' poles, two (2) 8' poles, and two (2) 12' poles. The pike poles shall be secured by either "J" slotted locking tubes and/or hinged door(s) that matches the rear body finish.

Upper Dunnage Area Extension

The upper dunnage area shall be provided with an extension to increase its storage capacity. The extension shall be approximately 34" long x 58" wide tapering in height from 12.75" at the front to 8" high across the rear. Coupled with the body's integral open storage area of 36" long x 55" wide x 14" deep, the upper dunnage area contains approximately 27 cu. ft. of open storage space. The walls of the dunnage area extension shall be constructed of aluminum diamond plate.

Ladder Tunnel Doors

A Robinson brushed aluminum roll-up door shall be installed for access to the rear ladder tunnel.

Single Compartment Door

A single compartment door shall be constructed using a box pan configuration. The outer door pan shall beveled and shall be constructed from 3/16" (0.188") aluminum plate. The inner door pan shall be constructed from 1/8" (0.125") smooth aluminum plate and shall have nutsert fittings to attach hold-open hardware. The inner pan shall have a 95-degree bend to form an integral drip rail.

The compartment door shall have a 1" x 9/16" (1" x 0.43") closed-cell "P" EPDM sponge gasket meeting ASTM D-1066 2A4 standards installed around the perimeter of the door to provide a seal that is resistant to oil, sunlight, and ozone.

A drain hole shall be installed in the lower corner of the inside door pan to assist with drainage. A polished stainless steel Hansen D-ring style twist-lock door handle with #459 latch shall be provided on the door. The 4-1/2" (4.5") D-ring handle shall be mounted directly to the door latching mechanism with screws that do not penetrate the door material for improved corrosion resistance.

The compartment door shall be securely attached to the apparatus body with a full-length stainless steel 1/4" (0.25") rod piano-type hinge isolated from the body and compartment door with a dielectric barrier. The door shall be attached with machine screws threaded into the doorframe. The door shall have a gas shock-style hold-open device.

An anodized aluminum drip rail shall be mounted over the compartment opening to assist in directing water runoff away from the compartment.

The door(s) shall be installed in the following location(s): L2, L7, R2, R7

Single Compartment Door

A single compartment door shall be constructed using a box pan configuration. The outer door pan shall beveled and shall be constructed from 3/16" (0.188") aluminum plate. The inner door pan shall be constructed from 1/8" (0.125") smooth aluminum plate and shall have nutsert fittings to attach hold-open hardware. The inner pan shall have a 95-degree bend to form an integral drip rail.

The compartment door shall have a 1" x 9/16" (1" x 0.43") closed-cell "P" EPDM sponge gasket meeting ASTM D-1066 2A4 standards installed around the perimeter of the door to provide a seal that is resistant to oil, sunlight, and ozone.

A drain hole shall be installed in the lower corner of the inside door pan to assist with drainage. A polished stainless steel Hansen D-ring style twist-lock door handle with #459 latch shall be provided on the door. The 4-1/2" (4.5") D-ring handle shall be mounted directly to the door latching mechanism with screws that do not penetrate the door material for improved corrosion resistance.

The compartment door shall be securely attached to the apparatus body with a full-length stainless steel 1/4" (0.25") rod piano-type hinge isolated from the body and compartment door

with a dielectric barrier. The door shall be attached with machine screws threaded into the doorframe. The door shall have gas shock-style hold-open devices.

An anodized aluminum drip rail shall be mounted over the compartment opening to assist in directing water runoff away from the compartment.

The door(s) shall be installed in the following location(s): L4, L5, R4, R5

Double Compartment Door

Double compartment doors shall be constructed using a box pan configuration. The outer door pans shall beveled and shall be constructed from 3/16" (0.188") aluminum plate. The inner door pans shall be constructed from 1/8" (0.125") smooth aluminum plate and shall have nutsert fittings to attach hold-open hardware. The inner pans shall have a 95-degree bend to form an integral drip rail.

The compartment doors shall have a 1" x 9/16" (1" x 0.43") closed-cell "P" EPDM sponge gasket meeting ASTM D-1066 2A4 standards installed around the perimeter of the doors to provide a seal that is resistant to oil, sunlight, and ozone.

A drain hole shall be installed in the lower corner of the inside door pan to assist with drainage. A polished stainless steel Hansen D-ring style twist-lock door handle with a #459 latch shall be provided on the primary door. The 4-1/2" (4.5") D-ring handle shall be mounted directly to the door latching mechanism with screws that do not penetrate the door material for improved corrosion resistance.

The secondary door shall have two (2) dual stage rotary latches, each with a 750 lb rating to hold the door in the closed position. The latches shall be mounted at the top and bottom of the door. A stainless steel paddle style handle shall be mounted on the interior pan of the door to actuate the rotary latches. The paddle handle shall be connected to the rotary latches by 5/32" (.156") diameter rods. Cable actuation shall not be deemed unacceptable due to the potential for cable stretch and slippage. The striker pins shall be 3/8" (.38") diameter with slotted mounting holes for adjustment.

The compartment doors shall be securely attached to the apparatus body with a full-length stainless steel 1/4" (0.25") rod piano-type hinge isolated from the body and compartment doors with a dielectric barrier. The doors shall be attached with machine screws threaded into the doorframe.

The doors shall have a gas shock-style hold-open device. The gas shocks shall have a 30 lb rating and be mounted near the top of the door (when possible).

An anodized aluminum drip rail shall be mounted over the compartment opening to assist in directing water runoff away from the compartment.

The door(s) shall be installed in the following location(s): L1, L3, L6, R1, R3, R6

Bracket Horizontal Ladder

Extension ladder mounting assembly shall consist of a 1/8" diamond plate boot bolted to the compartment top and a chrome plated handle to secure the ladder into the boot.

Location and type of ladder: over L1 for Little Giant model 17.

Rear Ladder Storage

A ladder storage tunnel shall be provided beneath the aerial device frame work. There shall be access to the ladders via an opening at the rear.

The ladders will be held captive top and bottom by aluminum tracks and slide on friction reducing material. All ladders shall be removable individually without having to remove any other ladder.

The ladder tunnel shall hold the following Duo-Safety ladders: (2) 1200-A 35' 2 section, (2) 1200-A 28' 2 section, (1) 16' roof, (1) 10' folding with feet.

Rear Mudflaps

The rear tires shall have a set of black mudflaps mounted behind the rear chassis wheels with OEM logo.

Floor Matting

This unit shall have all applicable compartment floors, shelves, and trays covered with a heavy duty Turtle Tile brand Black floor matting.

Fuel Fill

A recessed fuel fill shall be provided at the driver side rear wheel well area.

Body Wheelwell

The body wheel well frame shall be constructed from 6063-T5 aluminum extrusion with a slot the full length to permit an internal fit of 1/8" (0.125") aluminum treadplate. The wheel well trim shall be constructed from 6063-T5 formed aluminum extrusion. The wheel well liners shall be constructed of a 3/16" (.187") composite material. The liners shall be bolt-on and shall provide a maintenance-free and damage-resistant surface.

Tilt Jack Location

The cab tilt jack shall be located right side forward jack leg compartment low behind door in access panel (tilt sw low on frt wall).

Compartment Floor Insulation

Insulation shall be installed below the body's center and right side transverse compartment floor as well as the lower back wall of compartment R1. The insulation shall protect the compartment from excessive exhaust system heat.

Low Pressure Air Reel

A reel with 100' of 3/8" low pressure air hose and quick disconnect couplings shall be supplied. The reel shall be plumbed into the cascade air system for utility air and mounted as specified (controls shall be included with the cascade air system). The reel shall be wired directly to the truck 12-volt battery system, with finger push button rewind switch mounted to the reel. Locate reel in L3 suspended below fixed shelf offset rearward next to breathing air fill station.

Breathing Air System

Appleton Space-Saver mobile 2 position fill station that meets NFPA-1901 guidelines for mobile fill stations.

An automatic, air operated, safety interlock system shall be provided to prevent the accidental filling of a cylinder until the door is completely closed and latched.

The fill station shall be designed so if a cylinder should rupture, rapidly expanding air is vented through an opening in the bottom of the enclosure and out through the compartment floor. A breakaway rubber seal will be provided to seal the compartment floor.

An air storage system must be specified with this fill station.

Dimensions:

- 13.5"W x 23.5"D x 43"H (53"H with door open)
- 425 lbs

Exact location of fill station is TBD.

ASME storage bottles

Booster Pump

Booster unit to be self contained on one base plate with no moving parts exposed to the operator. It is to be supplied in a ready to operate condition with only one hook-up required. Booster shall be air-driven and powered from the same air supply which is furnished to it to boost. It shall be capable of boosting a supply of as low as 1000 psi to a maximum of as much as 6000 psi at a rate up to 50 cfm.

The system shall be designed so as to avoid high operating temperatures and the compression chambers are to be non-oil lubricated so as to avoid contamination of the boosted air. It shall be capable of continuous operation.

All components on the high pressure side of the unit are to be constructed of stainless steel. An approved safety valve is to be incorporated in the high pressure side.

The output pressure shall be controlled by the pressure switch on the booster and the adjustable high pressure regulator on the control panel.

Maintenance areas are to be easily accessible and normal maintenance within the scope of non-technical shop personnel.

A complete operator's manual, schematic and parts list are to be supplied with the unit.

Warranty is for one full year.

SCBA Storage

Eight (8) SCBA bottle storage compartments shall be provided. The compartments shall be 8" diameter by 25" deep and located four (4) each side in the body wheel well area.

Each SCBA bottle shall be held in place by a hinged cast aluminum door with a positive latch and shall include an inner door seal for increased protection against the elements.

The inner SCBA storage tube shall be made of high strength polyethylene to provide additional protection to the surface of the SCBA bottles.

Multiplex Electrical System

Electrical System

The apparatus shall incorporate a Weldon V-MUX multiplex 12 volt electrical system. The system shall have the capability of delivering multiple signals via a CAN bus. The electrical system installed by the apparatus manufacturer shall conform to current SAE standards, the latest FMVSS standards, and the requirements of the applicable NFPA 1901 standards.

The electrical system shall be pre-wired for optional computer modem accessibility to allow service personnel to easily plug in a modem to allow remote diagnostics.

The electrical circuits shall be provided with low voltage over-current protective devices. Such devices shall be accessible and located in required terminal connection locations or weather-resistant enclosures. The over-current protection shall be suitable for electrical equipment and shall be automatic reset type and meet SAE standards. All electrical equipment, switches, relays, terminals, and connectors shall have a direct current rating of 125 percent of maximum current for which the circuit is protected. The system shall have electro-magnetic interference suppression provided as required in applicable SAE standards.

Any electrical junction or terminal boxes shall be weather-resistant and located away from water spray conditions.

Multiplex System

For superior system integrity, the networked multiplex system shall meet the following minimum component requirements:

- The network system must be Peer to Peer technology based on RS485 protocol. No one module shall hold the programming for other modules. One or two modules on a network referred to as Peer to Peer, while the rest of the network consists of a one master and several slaves is not

considered Peer to Peer for this application.

- Modules shall be IP67 rated to handle the extreme operating environment found in the fire service industry.
- All modules shall be solid state circuitry utilizing MOS-FET technology and utilize Deutsch series input/output connectors.
- Each module that controls a device shall hold its own configuration program.
- Each module should be able to function as a standalone module. No “add-on” module will be acceptable to achieve this form of operation.
- Load shedding power management (8 levels).
- Switch input capability for chassis functions.
- Responsible for lighting device activation.
- Self-contained diagnostic indicators.
- Wire harness needed to interface electrical devices with multiplex modules.
- The grounds from each device should return to main ground trunk in each sub harness by the use of ultrasonic splices.

Wiring

All harnessing, wiring and connectors shall be manufactured to the following standards/guidelines. No exceptions.

- NFPA 1901-Standard for Automotive Fire Apparatus
- SAE J1127 and J1127
- IPC/WHMA-A-620 – Requirements and Acceptance for Cable and Wire Harness Assemblies. (Class 3 – High Performance Electronic Products)

All wiring shall be copper or copper alloys of a gauge rated to carry 125% of the maximum current for which the circuit is protected. Insulated wire and cable 8ga and smaller shall be SXL, GXL, or TXL per SAE J1128. Conductors 6ga and larger shall be SXL or SGT per SAE J1127.

All wiring shall be color coded and imprinted with the circuit's function. Minimum height of imprinted characters shall not be less than .082” plus or minus .01”. The imprinted characters shall repeat at a distance not greater than 3”.

A coil of wire shall be provided behind electrical appliances to allow them to be pulled away from mounting area for inspection and service work.

Wiring Protection

The overall covering of the conductors shall be loom or braid.

Braid style wiring covers shall be constructed using a woven PVC-coated nylon multifilament braiding yarn. The yarn shall have a diameter of no less than .04” and a tensile strength of 22lbs. The yarn shall have a service temperature rating of -65 F to 194 F. The braid shall consist of 24 strands of yarn with 21 black and 3 yellow. The yellow shall be oriented the same and be next to each other.

Wiring loom shall be flame retardant black nylon. The loom shall have a service temperature of -40 F to 300 F and be secured to the wire bundle with adhesive-backed vinyl tape.

Wiring Connectors

All connectors shall be Deutsch series unless a different series of connector is needed to mate to a supplier's component. The connectors and terminals shall be assembled per the connector/terminal manufacturer's specification. Crimble/Solderless terminals shall be acceptable. Heat shrink style shall be utilized unless used within the confines of the cab.

NFPA Required Testing of Electrical System

The apparatus shall be electrical tested upon completion of the vehicle and prior to delivery. The electrical testing, certifications, and test results shall be submitted with delivery documentation per requirements of NFPA #1901. The following minimum testing shall be completed by the apparatus manufacturer:

1. Reserve capacity test:

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load shall be activated for ten (10) minutes. All electrical loads shall be turned off prior to attempting to restart the engine. The battery system shall then be capable of restarting the engine. Failure to restart the engine shall be considered a test fail.

2. Alternator performance test at idle:

The minimum continuous electrical load shall be activated with the engine running at idle speed. The engine temperature shall be stabilized at normal operating temperature. The battery system shall be tested to detect the presence of battery discharge current. The detection of battery discharge current shall be considered a test failure.

3. Alternator performance test at full load:

The total continuous electrical load shall be activated with the engine running up to the engine manufacturer's governed speed. The test duration shall be a minimum of two (2) hours. Activation of the load management system shall be permitted during this test. However, an alarm sounded by excessive battery discharge, as detected by the system required in NFPA #1901 Standard, or a system voltage of less than 11.7 volts dc for a 12 volt nominal system, for more than 120 seconds, shall be considered a test failure.

4. Low voltage alarm test:

Following the completion of the above tests, the engine shall be shut off. The total continuous electrical load shall be activated and shall continue to be applied until the excessive battery discharge alarm activates. The battery voltage shall be measured at the battery terminals. With the load still applied, a reading of less than 11.7 volts dc for a 12 volt nominal system shall be considered a test failure. The battery system shall then be able to restart the engine. Failure to restart the engine shall be considered a test failure.

NFPA Required Documentation

The following documentation shall be provided on delivery of the apparatus:

- A. Documentation of the electrical system performance tests required above.
- B. A written load analysis, including:
 - a. The nameplate rating of the alternator
 - b. The alternator rating under the conditions
 - c. Each specified component load
 - d. Individual intermittent loads

Vehicle Data Recorder

A vehicle data recorder system shall be provided to comply with NFPA 1901, 2009 edition. The following data shall be monitored:

- Vehicle speed MPH
- Acceleration (from speedometer) MPH/Sec.
- Deceleration (from speedometer) MPH/Sec.
- Engine speed RPM
- Engine throttle position % of full throttle

- ABS Event On/Off
- Seat occupied status Occupied Yes/No by position
- Seat belt status Buckled Yes/No by position
- Master Optical Warning Device Switch On/Off
- Time: 24 hour time
- Date: Year/Month/Day

Occupant Detection System

There shall be a visual and audible warning system installed in the cab that indicates the occupant buckle status of all cab seating positions that are designed to be occupied during vehicle movement.

The audible warning shall activate when the vehicle's park brake is released and a seat position is not in a valid state. A valid state is defined as a seat that is unoccupied and the seat belt is unbuckled, or one that has the seat belt buckled after the seat has been occupied.

The visual warning shall consist of a graphical representation of each cab seat in the multiplex display screen that will continuously indicate the validity of each seat position.

The system shall include a seat sensor and safety belt latch switch for each cab seating position, audible alarm and braided wiring harness.

Multiplex Display

The V-MUX multiplex electrical system shall include a Vista IV color display.

The display shall have the following features:

- Aspect ratio of 16:9 (Wide Screen)
- Diagonal measurement of no less than 7"
- Master warning switch
- Engine high idle switch
- Five (5) tactal switches to access secondary menus
- Eight (8) multi-function programmable tactal switches
- Specific door ajar indication
- Real time clock
- Provides access to the multiplex system diagnostics
- Video capability for optional back-up camera(s) and GPS display

The display shall be located driver's side engine cover.

Light Bars

A pair of Whelen 24" Mini-Freedom LED light bars (model FT8RRRRF) with MKEZ7 mounts shall be provided. The light bars shall be installed side facing at the front cab corners. Each light bar shall have four (4) red LED modules, two (2) corner mounted facing forward, one (1) 400 series side facing and one (1) corner mounted at the rear facing outward. The light bars shall have clear domes.

Lower Level Warning Light Package

Eight (8) Whelen Super 600 LED light heads and two (2) Whelen Super 500 LED light heads shall be provided.

The rectangular lights shall include chrome flanges where applicable. The lights shall be wired with weatherproof connectors and shall be mounted as close to the corner points of the apparatus as is practical as follows:

- Two (2) Whelen 600 Super LED Red lights on the front of the apparatus facing forward
- Two (2) Whelen 600 Super LED Red lights on the rear of the apparatus facing rearward
- Two (2) lights each side of the apparatus, one (1) Whelen 600 Super LED Red each side at the

forward most point (as practical), and one (1) Whelen 500 Super LED TIR6 Red with model 5TSMAC chrome flange each side at the rearward most point (as practical).

- One (1) Whelen 600 Super LED Red light each side of the apparatus centrally located to provide mid ship warning light.

The side facing lights shall be located at forward most position, in rear wheel well offset to front, and side facing at rear of body in rubrail if equipped.

All warning devices shall be surface mounted in compliance with NFPA standards.

Upper Rear Warning Lights

Whelen model B6LED beacons shall be supplied on polished aluminum mounts. Each unit shall consist of a LED upper beacon with red dome and a 700 series Super LED with Red lens.

The lights shall be located rear upper body on aerial style brackets to meet upper Zone C requirements.

Hazard (Door Ajar) Light

There shall be a 2" red LED hazard light installed as specified.

The light shall be located center overhead.

Warning Lights

Two (2) Whelen 600 series Super LED light heads with red lenses shall be provided. The rectangular lights shall include chrome flanges where applicable.

Location: (1) each side above tail lights.

Warning Lights

Two (2) Whelen 500 series TIR6 Super LED light heads with red lens shall be provided. The rectangular lights shall include model 5TSMAC chrome flanges where applicable.

Location: (1) each side below forward compartments in rubrail if equipped, (1) each side just behind rear wheels in rubrail if equipped.

Electronic Siren

A Federal PA300 siren model 690010 solid state electronic siren with attached noise-canceling microphone shall be installed. The unit shall be capable of driving a single high power speaker up to 200 watts to achieve a sound output level that meets Class "A" requirements.

Operating modes shall include Hi-Lo, yelp, wail, P.A., air horn and radio re-broadcast.

The siren shall be recessed mounted in the cab.

Electronic Siren Control Location

The electronic siren control shall be located in the center overhead.

Mechanical Siren

A chrome plated and pedestal mounted Federal Q2B-P coaster siren shall be installed on top of the front bumper extension. An electric siren brake switch shall be located in the cab accessible to the driver.

The siren shall be located driver side front bumper.

Siren Speaker

One (1) Federal Signal model ES100 Dynamax 100 watt speaker shall be flush mounted as far forward and as low as possible on the front of the vehicle. A polished model MSFMT with "E-ONE" grille shall be provided on the outside of the speaker to prevent road debris from entering the speaker.

Speaker dimensions shall be: 5.5 in. high x 5.9 in. wide x 2.5 in. deep. Weight = 5.5 lbs.

The speaker shall produce a minimum sound output of 120 dB at 10 feet to meet current NFPA 1901 requirements.

The speaker shall be located officer side front bumper.

Tail Lights

Two (2) Whelen model 600 series LED (Light Emitting Diode) lights with one (1) Whelen 600 series halogen light shall be installed in a Cast 4 housing in a vertical position each side at rear and wired with weatherproof connectors.

Light functions shall be as follows:

- LED red running light with red brake light in upper position.
- LED amber populated arrow pattern turn signal in middle position.
- Halogen 27 watt clear back-up light in lower position.

A one-piece polished aluminum trim casting shall be mounted around the three (3) individual lights in a vertical position. The lower space will be used by the 6" x 4" lower NFPA warning light.

License Plate Light

One (1) Truck-Lite model 15905 white LED license plate light mounted in a Truck-Lite model 15732 chrome plated plastic license plate housing shall be mounted at the rear of the body.

LED Marker Lights

LED clearance/marker lights shall be installed as specified.

Upper Cab:

- Five (5) amber LED clearance lights on the cab roof.

Lower Cab:

- One (1) amber LED side turn/marker each side of cab ahead of the front door hinge.

Upper Body:

- One (1) red Truck-Lite LED clearance light each side, rear of body to the side.

Lower Body:

- Three (3) red Truck-Lite LED clearance lights centered at rear, recessed in the rubrail.
- One (1) red Truck-Lite LED clearance light each side at the trailing edge of the apparatus body, recessed in the rubrail.
- One (1) amber Truck-Lite LED clearance light each side front of body just in front of rear wheels, recessed in the rubrail.
- One (1) amber Truck-Lite LED clearance/auxiliary turn light each side front of body, recessed in the rubrail.

Aerial Platform:

- Three (3) amber LED clearance lights centered on the front lower section of the aerial platform.

Marker Lights

One (1) pair of Britax model L427.203L.12V LED amber/red marker rubber housed lights shall be provided. The lights shall be located on the rear body corners mounted in the down angle position. The red lenses shall illuminate to the rear of the apparatus and the amber shall illuminate to the front of the apparatus. The lights shall be wired to the marker light circuit.

License Plate Bracket

There shall be bracket fabricated from aluminum diamond plate, secured to rear of the body to accommodate a license plate.

Compartment Light Package

Two (2) ROM V3 compartment light strips shall be mounted in each body compartment greater than 4 cu. ft. Transverse compartments shall have four (4) lights located two (2) each side.

Each light bar shall include sixteen (16) super bright white LEDs per foot mounted to circuit boards that have acrylic conformal coating for corrosion protection. The LED circuit boards shall be mounted to an extruded aluminum base with lexan lens. The lights shall be waterproof up to 1 meter (3.3 feet).

Compartment lights shall be wired to a master on/off rocker switch on the cab switch panel. The wiring connection for the compartment lights shall be made with a weather-resistant plug in style connector. A single water and corrosion-resistant switch with a polycarbonate actuator and sealed contacts shall control each compartment light. The switch shall allow the light to illuminate if the compartment door is open.

Step Lights

The apparatus shall be equipped with a sufficient quantity of lights to properly illuminate the steps around the apparatus in accordance with current NFPA requirements. The lights shall be 4" circular LED (Light Emitting Diode) with clear lenses (2" if space is limited) mounted in a resilient shock absorbent mount for improved bulb life. The wiring connections shall be made with a weather resistant plug in style connector.

The step lights shall be switched from the cab dash with the work light switch.

Ground Lights

The apparatus shall be equipped with a sufficient quantity of lights to properly illuminate the ground areas around the apparatus in accordance with current NFPA requirements. The lights shall be 4" circular LED (Light Emitting Diode) with clear lenses mounted in a resilient shock absorbent mount for improved bulb life. The wiring connections shall be made with a weather resistant plug in style connector.

Ground area lights shall be switched from the cab dash with the work light switch.

One (1) ground light shall be supplied under each side of the front bumper extension if equipped. Lights in areas under the driver and crew area exits shall be activated automatically when the exit doors are opened.

Deck/Scene Light Wired to Back-Up Lights

The rear deck or scene lights shall be activated when the chassis is placed in reverse to provide additional lighting, in addition to the back-up lights, when backing the vehicle.

Deck Lights

Two (2) Whelen round 12 Super LED model PFBP12C floodlights with black housing and chrome rear covers shall be installed at the rear of the apparatus. The rear deck lights shall be switched with the work light switch in the cab.

Location: (1) on each side up high rear of body.

Scene Lights

Two (2) Whelen model 60C0ENZR surface mounted 600 series Super LED clear scene lights shall be provided.

Each shall have 12 Super LED diodes with internal light deflecting optics. The internal light deflecting optics shall redirect the light from 8 - 32 degrees.

Lights shall be located (1) each side of cab, rearward of forward doors, up high and switched in cab (side facing lights switched separately).

Engine Compartment Light

There shall be lighting provided in compliance with NFPA to illuminate the engine compartment area.

Hand Held Spotlight

A Specialty #2150 hand held spotlight with mounting bracket shall be provided. It shall be located officer's side with a 12 volt receptacle.

Backing Lights

A pair of Zico #ZQL-SS-H7614 sealed beam backing lights shall be provided. The lights shall have a polished stainless steel housing. Each light shall provide additional lighting for backing the vehicle and shall operate when the vehicle is placed in reverse and tied in to the cornering light circuit

The lights shall be located center of rear wheel well.

Foot Switch

A heavy duty metal floor mounted foot switch shall be installed to operate the air horns. It shall be located officer's side.

Foot Switch

A heavy duty metal floor mounted foot switch shall be installed to operate the Q2B siren. It shall be located driver's side, officer's side.

Rocker Switch

A 12 volt rocker switch shall be installed.

The switch shall be located driver rear of body for rear work lights.

Switch

A relay shall be provided to allow operation of the specified 120/240 volt device from a remote location other than the circuit breaker box. The relay shall be mounted in a weather resistant enclosure mounted near the breaker box. A remote switch shall be mounted as specified.

Location: programmed to multiplex display for driver's side cab/body 120/240V scene light(s), programmed to multiplex display for officer's side cab/body 120/240V scene light(s), driver side of cab dash electrical access panel for quartz lights at tip of aerial (aerial circuit), programmed to multiplex display for 120/240V scene light(s) at tip of aerial (aerial circuit).

Cab Tilt Switch

The cab tilt shall be controlled by Ramsey weatherproof momentary action push-button switches connected to a cord. The cord shall control tilting and lowering functions of the cab and have an extended length of 36".

The plug-in for the control shall be located next to manual cab tilt pump.

Rear Cab Heater Switch

A 12V rocker switch or toggle (if applicable) shall be provided for the rear cab heater(s).

The switch location and function: interior cab rear facing officer side 3X3 for driver and officer side cab heaters.

Two-Way Intercom

A two-way Atkinson Dynamics (Federal Signal) intercom system shall be installed to provide communications between the turntable control station and the aerial tip. The system shall consist of a 12 volt transistorized amplifier and two (2) waterproof speaker / microphones.

In addition to the combination speaker / microphone, the turntable shall include a volume control and a push to talk button. The speaker / microphone at the tip shall be hands free operation.

Camera Back-Up

There shall be a Safety Vision camera model number SV-625B-KIT provided. The camera shall be mounted up high at the rear of the vehicle to provide a wide angle rear view with audio. The camera shall include a cable with metallic waterproof threaded o-ring seal connectors to ensure positive connection between video cable and camera to prevent unplugging due to vibration

resulting in video loss to vehicle operator. The camera shall be interlocked with the chassis transmission. When the apparatus is placed in reverse the camera shall automatically be activated and when the transmission is placed in any other gear the screen shall return to the previously displayed screen.

Alternating Headlights

The chassis high beam headlights shall alternately flash and shall be controlled by a rocker switch mounted inside the cab.

Back-Up Alarm

An electronic back-up alarm shall be supplied. The 97 dB alarm shall be wired into the chassis back-up lights to signal when the vehicle is in reverse gear.

12 Volt DC Power Distribution Module

There shall be a 12 place 12 volt DC power distribution module installed as specified.

The module will have six (6) circuits wired directly to the battery and have six (6) circuits wired through the master battery switch with 12 positions for grounds. Connection to the power module circuit will be through a .250 female spade connector. Each buss will be protected with a 50 amp circuit breaker for overload protection. The module will accept ATC blade type fuses or 22X series circuit breakers.

The module shall be located behind officer's seat.

Hydraulic Generator

A Smart Power model HR-110 top mount style 10000 watt hydraulic generator shall be provided. The generator shall be installed officer side of open storage area.

The unit shall come equipped with: modular generator unit (which includes the hydraulic motor and filter, generator, and cooler), axial piston hydraulic pump, hydraulic reservoir, and a gauge panel.

The gauge panel shall display voltage, hour meter, frequency, and amperage.

The hydraulic motor, generator, blower, cooler, and necessary hydraulic components shall be mounted in a rugged steel case.

The modular generator unit shall be 32" long x 13.50" wide x 17.00" high and weigh approximately 240 pounds.

The hydraulic pump shall be driven by a chassis transmission mounted power take off (PTO).

A generator control / PTO engage switch shall be mounted on the cab instrument panel to engage the PTO and start the generator.

Ratings and Capacity

Rating:	10000 watts continuous 12000 watts peak
Volts:	120/240 volts
Phase:	Single, 4 wire
Frequency:	60 Hz
Amperage:	83 amps @ 120 volts or 42 amps @ 240 volts
Engine speed at engagement:	Recommend below 1000 RPM
Operation range:	800 to 2100 RPM

Testing

The generator shall be tested in accordance with current NFPA 1901 standards.

Notes:

*All ratings and capacities shall be derived utilizing current NFPA 1901 test parameters.

*Extreme ambient temperatures could affect generator performance.

3rd Party Generator Testing

The generator shall be tested at the manufacturer's facility by an independent, third-party testing service. The conditions and testing of the generator shall be as outlined in current NFPA 1901.

The test shall include operating the generator for two hours at 100% of the rated load. Power source voltage, amps, frequency shall be monitored. The prime mover's oil pressure, water temperature, transmission temperature (if applicable) and power source hydraulic fluid temperature (if applicable) shall be monitored during testing.

The results of the test shall be recorded and provided with delivery documentation.

Circuit Breaker Panel

A twelve (12) place breaker box with up to twelve (12) appropriately sized ground-fault interrupter circuit breakers shall be supplied. The breaker box will include a master breaker sized according to the generator output. The breaker box will be located in the specified compartment, not to exceed 12' run of wire.

Note: If generator is 5.5KW or less, the main breaker will occupy 2 places, leaving 10 available. Dimensions: 17.92" high x 14.25" wide x 3.75" deep.

Location: L1 forward wall.

Whelen Pioneer 12V LED Flood Light

A Whelen Pioneer Plus series 120V flood light LED light fixture(s) shall be provided on a Whelen permanent mount non-telescoping base. The rectangular extruded light fixture with die cast end caps shall measure 14" wide by 4-5/8" high by 3" deep and have a black powder coat finish. The light fixture shall have a dual panel (4) clusters of LED lamps with molded vacuum metalized reflector that draws 1.25 amps and produce 11,000 usable lumens.

The light assembly shall be mounted on the body as specified. The base shall allow for 360-degree rotation of the light. A locking knob shall hold the pole at the desired angle. A switch shall be provided in the warning light switch panel.

Location: driver side forward compartment top, officer side forward compartment top, above forward area of L4, above forward area of R4.

Receptacle

A 15 amp/110 volt 3-prong straight blade NEMA 5-20 duplex household receptacle with stainless steel cover plate shall be installed in a non-weather exposed area as specified by the department. The receptacle shall be wired to the inlet receptacle where it will have overcurrent protection from an external source.

Location: In cab driver side on 3 x 3 post rear facing just above engine cover, In cab officer side on 3 x 3 post rear facing just above engine cover.

Electric Cord Reels

Hannay electric rewind cord reel(s) (ECR 1616-17-18) shall be installed and located atop the truck on both left and right side. The exact location shall be determined at the pre build meeting. The reel(s) shall include 200' of yellow 10 gauge 3 conductor type SOWA cord. The cord shall be rated at 20 amps @ 110 volts. The end of the cord shall be terminated for the installation of a department required connector.

Stainless steel cord reel rollers shall be installed and located on the reel.

The rollers shall facilitate smooth removal of the electric cord.

Junction Boxes

A power box with four (4) 15 amp/110 volt twist lock receptacles NEMA L5-15 shall be hardwired to the cord reel. The receptacles shall be enclosed in a UL listed, NEMA Type 3R cast aluminum box with aluminum finishes and NFPA required indicator light.

Located on cord for reel in R3 ceiling offset forward, L3 ceiling offset forward.

100 Ft. Rear Mount Elevating Platform

Elevating Platform Requirements

It is the intent of these specifications to describe a telescopic elevating platform of the open truss design that is compliant with NFPA 1901 (2009 edition) chapter 19 sections 19.7 through 19.12 and sections 19.17 through 19.25. Some portions of this specification exceed minimum NFPA recommendations and are to be considered a minimum requirement to be met.

The elevating platform shall consist of three (3) extruded aluminum telescopic ladder sections operating from approximately -6 degrees to 80 degrees and designed to provide continuous egress for firefighters and civilians from an elevated position to the turntable.

The elevating platform shall have a vertical height of not less than 100' at full extension and elevation. The measurement of height shall be consistent with NFPA 1901 section 19.7.2.

The rated horizontal reach shall be 91'-6" The measurement of horizontal reach shall be consistent with NFPA 1901 19.7.3. The measurement shall be from the outer edge of the platform handrail at full extension to the centerline of turntable rotation.

The aerial shall be able to rotate 270 degrees at -6 degrees elevation, 300 degrees at -3 degrees elevation and a full 360 degrees at as low as 5 degrees of elevation (based on optional body equipment).

Aluminum Elevating Platform

The aerial ladder shall exceed the requirements of NFPA 1901 19.7 Elevating Platform Requirements as detailed in these specifications. To ensure a high strength-to-weight ratio and an inherent corrosion resistance, the aerial device shall be completely constructed of high strength aluminum. All side rails, rungs, handrails, uprights, and K-braces shall be made of structural 6061T6 aluminum alloy extrusions. All material shall be tested and certified by the material supplier. All ladder sections shall be semi-automatically welded by inert gas shielded arc welding methods using 5356 aluminum alloy welding wire. Structural rivets or bolts shall not be utilized in the ladder weldment sections.

Due to the unpredictable nature of fire-ground operations, a minimum safety factor of 2.5 to 1 is desired. This structural safety factor shall apply to all structural aerial components including turntable and torque box stabilizer components. Definition of the structural safety factor shall be as outlined in NFPA 1901 A.19.20.1:

DL = Dead load stress. Stress produced by the weight of the aerial device and all permanently attached components.

RL = Rated capacity stress. Stress produced by the rated capacity load of the ladder.

WL = Water load stress. Stress produced by nozzle reaction force and the weight of water in the water delivery system.

FY = Material yield strength. The stress at which material exhibits permanent deformation.

$$2.5 \times \mathbf{DL} + 2.5 \times \mathbf{RL} + 2 \times \mathbf{WL} \text{ equal to/less than } \mathbf{FY}$$

The minimum NFPA specification is exceeded in this paragraph by requiring safety margin above 2 to 1 while flowing water.

The stability factor or tip over safety margin shall be a minimum of 1.5 to 1 as defined by NFPA 1901 19.21.

An independent engineering firm shall verify the aerial safety factor. Design verification shall include computer modeling and analysis performed by an independent registered professional engineer. Verification shall include written certification from the independent engineering firm made available by the manufacturer upon request from the purchaser.

All welding of aerial components, including the aerial ladder sections, turntable, torque box and outriggers shall be performed by welders who are certified to American Welding Society Standards D1.1, D1.2 and D1.3 as outlined in NFPA 1901 19.22.3.1.

The weldment assemblies of each production unit shall be tested visually and mechanically by an ASNT certified level II non-destructive test technician to comply with NFPA 1901 19.22.2.

Testing procedures shall conform to the American Welding Society Standard B1.10 Guide for non-destructive testing. Test methods may include dye penetrate, ultrasound, and magnetic particle where applicable.

Each ladder section shall consist of two (2) heavy extruded aluminum side rails and a combination of aluminum rungs, tubular diagonals, and two (2) full-length handrails. The rungs on all sections shall be K-braced for maximum lateral stability. This K-bracing shall extend to the center of each rung to minimize ladder side deflection.

The ladder rungs shall be designed to eliminate the need for rubber rung covers. The rungs shall be spaced on 14 inch centers and have integral skid-resistant surfaces as outlined in NFPA 1901 19.2.5. An oval-shaped rung shall be utilized to provide a larger step surface at low angles and more comfortable grip at elevated positions. The minimum design load shall be 500 pounds distributed over a 3-1/2" wide area per rung as outlined in NFPA 1901 19.2.5.4.

The aerial ladder shall exceed NFPA 1901 sections 19.2.6 and 19.2.8 governing the minimum ladder section width and handrail height. The following minimum dimensions shall be used in the construction of the aerial device:

Section	Width	Height
Base Section	45-1/4"	34-5/8"
Second Section	36-1/4"	30-3/8"
Fly Section	28-1/2"	26-9/16"

Firefighting Platform

The platform shall be entirely constructed of aluminum and mounted to the end of the fly section. The inside of the platform shall measure 37-1/4" long x 74-3/4" wide and contain 18.9 square feet of floor space. This exceeds the minimum NFPA 1901 19.7.6 requirement of 14 square feet. A continuous railing with 42" high side rails shall be supplied on all sides of the platform. There shall be no openings below the handrail larger than 24" in either direction.

The platform shall be constructed using a perimeter pipe system to carry water and serve as a structural component of the platform. The design of the platform shall minimize the distance between ladder center line and platform bottom heat shield. This requirement is to provide maximum visibility for the driver. A 4" high kick plate and grated floor assembly shall be supplied on the platform floor. The grated floor shall prevent water accumulation in the platform. These requirements are detailed in NFPA 1901 19.7.6.3 through 19.7.6.5.

A reflective aluminum heat shield shall be supplied on the front, bottom, sides, and rear of the platform as outlined in NFPA 1901 19.7.6.6.

A step shall be supplied over the pipe system around the front and sides of the platform for easy egress. This step shall be 8" deep and provide an additional 6.5 square feet of platform floor space.

The platform shall have three (3) gates for entry and exit, exceeding the two (2) required by NFPA 1901 19.7.6.2.2 through 19.7.6.2.3. Two (2) of the gates shall be mounted on the front corners of the platform. The front gates shall be 20-1/2" wide with inward swinging spring-loaded doors. Each front door shall have an exterior mounted self latching handle. The third platform access shall be at the rear of the platform to enter from the ladder. A Fire Research

Aerial Saver shall be mounted in the opening with a loop that extends under the bar. The bar shall slide up or in, but not out toward the base.

Harness Attachments

There shall be four (4) attachment rings inside the platform for operators to attach fall protection harnesses (Life Belts). The rings shall be designed for personnel harnesses and are not intended to secure rescue ropes.

Platform Water Curtain

A water curtain system shall be installed under the platform to provide a 75 GPM cooling stream beneath the platform as outlined in NFPA 1901 19.7.6.7. The nozzle shall be controlled from the base and tip control stations.

Platform Leveling System

An automatic platform leveling system shall be supplied as outlined in NFPA 1901 19.10.2. The system shall provide automatic leveling through a dual redundant hydraulic cylinder system. The system shall incorporate (4) hydraulic cylinders to level the platform. The lower cylinders shall be mounted between the aerial turntable and base section and the upper cylinders shall be mounted between the fly section and the platform. The system shall utilize oil exchange between the cylinders to provide smooth leveling at all operating positions. In addition to the automatic controls, the system shall include manual controls located at both the base and the platform to adjust platform pitch if needed. The system shall be supplied with load holding valves on the upper cylinders to prevent movement of the platform in the event of a ruptured hydraulic hose.

Platform Lifting Eyes

A pair of lifting eyes shall be provided below the rear of the platform. The lifting eyes shall allow for a load of 375 pounds each (750 pounds total).

Aerial Finish

To reduce maintenance expense the aerial shall have a natural aluminum swirled finish. Visible inspection of all ladder weld joints shall be possible without having to remove paint or body filler to reveal the weld bead.

Ladder Extension Mechanism

Both power extension and retraction shall be furnished and meet the requirements of NFPA 1901 section 19.19, 19.20.3, and 19.5.3. Extension shall be by way of two (2) extending cylinders mounted on the side of the base section of the ladder.

Extension Cylinder Size:

Bore: 5"

Stroke: 77"

The cylinders shall operate through a block and tackle cable arrangement to extend and retract the ladder. Maximum extension of the ladder is to be automatically limited by the stroke of the cylinders. The normal operating cable safety factor shall be 5:1 and the stall safety factor shall be 2:1 based on the breaking strength of the cables. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1 to 12. The cables shall be treated with Pre-Lube 6 for increased service life.

Ladder Cable Size:

1st section (4 cables 2 extend, 2 retract): 3/4" 6 x 19 galvanized cable

2nd section (4 cables 2 extend, 2 retract): 1/2" 6 x 19 galvanized cable

Ladder Slide System

The ladder assembly shall consist of three (3) separate weldments that shall extend and retract within each other. Polymer slide pads shall be utilized between each section to minimize friction.

Four (4) interlocking load transfer stations shall be utilized at the end of each of the two (2) base ladder sections. The interlocking load transfer stations shall handle load transfer between ladder sections and encapsulate the slide pads.

The two (2) base ladder sections shall each be provided with six (6) slide cushions. The cushions are designed to limit movement between the ladder sections resulting in smoother operation and less wear on the ladder sections.

Aerial Extension Indicator

Reflective tape stripes shall be installed on the ladder top handrail of the base section to indicate extension in 5 foot increments. Numbers shall be supplied at 10 foot increments. A reflective dot on the base of the 2nd section shall provide a visual reference for the operator to estimate aerial elevation.

Elevating Platform Operating Positions

The elevating platform shall have two (2) control stations as outlined in NFPA 1901 19.9 with the lower controls capable of overriding the platform controls. The operator's lower position shall be located on the left side of the aerial turntable. The console shall be angled with an etched panel for long service life. The lower control panel shall feature a roll-top type of cover to protect all controls from the elements. The upper control console shall be located in the front center of the platform and shall include all of the operational, aerial functions, and control switches (less the Intercom controls) as in the lower console. The centered console location shall allow easy access in and out of the left and right corner gates.

The consoles shall include lighting for night operations and controls shall all be labeled for easy identification of operation.

Aerial Ladder Control Levers

The control levers shall be arranged as outlined in NFPA 19.17.7. The first lever from the left shall be the extension control (forward for extend and back for retract). The second lever shall be for rotation (forward for clockwise and back for counter clockwise). The third handle shall control elevation (forward for down and back for up). A ring around the control console shall be provided to prevent unintentional movement as outlined in NFPA 19.17.6.2.

Variable Speed Control System

The aerial hydraulic system shall be equipped with a microprocessor based control system that shall deliver variable rotation and elevation speeds based on platform position. The system shall allow the aerial to proportionately operate quicker, either through elevation or retraction, as the platform is brought in closer to the turntable centerline. This feature provides quicker ladder movement when not fully extended and/or elevated. The variable speed system also offers the operator more consistent platform movement speed (distance per second) regardless of platform location, equating to more predictable aerial control.

The aerial control system shall include electronic ramping to provide smooth acceleration and deceleration of aerial functions during sudden movements of the operator control levers. The control system shall also monitor the end of the stroke position of both the elevation and extension cylinders to bring the aerial to a smooth and controlled stop at the end of the cylinder stroke.

The control system shall be provided with a slow speed (Creep) switch. This switch, when activated, shall reduce aerial operating speeds, allowing for pin-point platform placement. When in the creep mode, the ramping feature of the controls system shall be disabled allowing for precise aerial placement.

The control system shall have self-diagnostic features and be pre-set at the factory.

The elevating platform shall utilize six (6) proportional control valves for aerial device movements. The electro-hydraulic valves shall permit the use of base and tip controllers and minimize hydraulic connections.

The hydraulic system valve body shall be located under the ladder base step to provide as much turntable workspace as possible.

The control system shall have manual overrides in the event of a system failure. The overrides shall be located in a compartment just below the turntable control console. The manual system shall be organized to match the base controllers and is function labeled.

Body Protection System

The control system shall monitor rotation angle and elevation angle and shall automatically control the operational envelope of the aerial device to prevent contact with the aerial body or cab during low level operations. The system shall bring the aerial to a smooth and controlled stop whenever the aerial is approaching the body or cab. Indicator lights shall be included on both control consoles will show that the system has limited aerial movement. A momentary switch shall be provided at each control console to allow the operator to over-ride the body protection system and move the aerial closer to the body if needed.

Load Indication System

Two (2) lighted elevation/safe load indicator diagrams shall be provided on the aerial ladder to indicate safe load capacity at any angle of elevation. One (1) shall be located on the lower right side of the base section, and one (1) shall be located upper left side of the fly section. The safe load indicators shall be 15`` x 15`` in size and clearly communicate aerial capacity in any one of the following conditions: tip load, tip load with water flowing, and distributed load at full extension. The charts shall identify capacity using graphic characters to indicate each 250 lb. increment. The charts shall be illuminated and contain warnings for electrocution hazards from power lines and lightning.

Operation Times

The aerial shall complete the NFPA 1901 19.7.5 time test in no more than 100 seconds, exceeding the NFPA minimum requirement of 150 seconds. This test involves raising the aerial from the bedded position to full elevation and extension and rotating to 90 degrees. This test is to begin with the stabilizers deployed.

Time to extend ladder (@60 degree elevation):	Maximum 45 seconds
Time to retract ladder (@60 degree elevation):	Maximum 45 seconds
Time to raise ladder (fully retracted, 0 to 75 degrees elevation):	Maximum 55 seconds
Time to raise ladder (fully extended, 0 to 75 degrees elevation):	Maximum 80 seconds
Time to lower ladder (fully retracted, 75 to 0 degrees elevation):	Maximum 50 seconds
Time to lower ladder (fully extended, 75 to 0 degrees elevation):	Maximum 75 seconds
Time to rotate 180 degrees (fully retracted at 10 degrees elevation):	Maximum 60 seconds
Time to rotate 180 degrees (fully extended at 10 degrees elevation):	Maximum 120 seconds

Elevating Platform Rated Capacity

The aerial device shall have a rated capacity of 1305 lbs. consistent with NFPA 1901 19.8.1 and 19.8.2. The rated capacity shall include 1000 lbs. in personnel allowance and 305 lbs. for equipment mounted at the tip of the aerial. The aerial device shall be rated in multiple configurations as outlined in 19.8.6.

The elevating platform shall be capable of delivering a 1250 GPM master stream from the platform while carrying a minimum of 500 lbs. as outlined in 19.8.4. A sign mounted at the base of the aerial shall communicate the following ratings in the unsupported fully extended

configuration while maintaining a 2.5 to 1 safety margin as defined in NFPA 1901. The loads in each configuration are in addition to 305 lbs. of equipment mounted at the tip.

Condition #1- Tip load only, no water flowing

Elevation	Capacity	Pounds
-6 to 80 degrees	4 people	1000 lbs.

Condition #2- Distributed loads no water flowing (These include two people in the platform from -6 to 44 degrees and four people in the platform from 45 to 80 degrees)

Elevation	Capacity	Pounds
-6 to 20 degrees	5 people	1250 lbs.
21 to 30 degrees	6 people	1500 lbs.
31 to 45 degrees	10 people	2500 lbs.
46 to 80 degrees	12 people	3000 lbs.

Condition #3- Platform tip load while flowing 1250 gpm with pre-piped waterway

Elevation	Capacity	Pounds
-6 to 80 degrees	2 people	500 lbs

Hydraulic System

Hydraulic power for all operations shall be supplied by a chassis-mounted variable displacement pressure compensated pump for consistent and rapid response. The variable displacement piston pump shall be able to supply 30 GPM at a maximum pressure of 3000 PSI. The system shall operate between 1000 and 2500 PSI with flow controls to protect hydraulic components and incorporate a relief valve set at 2800 PSI to prevent over-pressurization.

An interlock device shall be provided to prevent activation of the aerial ladder hydraulic pump until either the transmission is placed in neutral and the parking brake is set, or the transmission is placed in drive and the rear driveline is disengaged as outlined in NFPA 19.17.3.

The hydraulic system shall be of the latest design and incorporate features to minimize heat build up and provide smooth control of the aerial ladder. The system shall meet the performance requirement in NFPA 19.19.6 and 19.19.7, which requires adequate cooling under 2 ½ hours of operations. To control operating system temperature, a hydraulic oil cooler shall be supplied. The air to oil cooler shall be mounted on the turntable so as not to reduce the cooling capacity of the engine. A 12-volt fan shall move air across a tube and fin radiator system. The cooler shall be mounted on the turntable ahead of the operator's console.

All hydraulic components that are non-sealing whose failure could result in the movement of the aerial shall comply with NFPA 19.19.1 and have burst strength of 4 to 1. Dynamic sealing components whose failure could cause aerial movement shall have a margin of 2 to 1 on maximum operating pressure per NFPA 19.19.1.1. All hydraulic hoses, tubes, and connections shall have minimum burst strength of 3 to 1 per NFPA 19.19.2.

The hydraulic system shall consist of a 60 gallon reservoir mounted to the torque box and plumbed to the hydraulic pump. The tank shall be supplied with a removable top to access the tank strainer filter. There shall be plumbing for a supply and return line and a tank drain on the reservoir. The reservoir cap shall be marked per NFPA 19.19.5.2. Gated valves under the tank shall facilitate filter changes. Connections on the bottom of the tank shall utilize flange fittings for ease of service.

The hydraulic system shall use 5w-20 multi-weight, SAE 32 grade oil and incorporate the following filters to provide dependable service:

Reservoir Breather:	10-micron
Magnetic Reservoir Strainer:	125-mesh

Pressure Filter (Torque Box): 3-micron
Return Filter: 10-micron

The aerial hydraulic system shall be designed in such a manner that a hydraulic pump failure or line rupture shall not allow the aerial or outriggers to lose position. Hydraulic holding valves shall be mounted directly on cylinders. To ensure reliable performance of holding valves, no hoses shall be permitted between a holding valve and cylinder.

The hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of NFPA 1901 19.18.6. The auxiliary power unit shall be two (2) 12 volt pumps connected to the chassis electrical system. The pumps shall provide operation at reduced speeds to store the aerial device and stabilizers for road transportation. Self-centering switches shall be provided at the turntable and each stabilizer control station to activate the system. The system shall be designed to provide a minimum of five (5) minutes of hydraulic power to operate functions.

Hydraulic power to the ladder shall be transferred from the torque box by a hydraulic swivel.

Aerial Torque Box

The aerial shall utilize an integral torque box design. The integral torque box design shall serve to carry the chassis, body, and aerial device as an integrated system. The system design shall provide a lower center of gravity to enhance road performance, a mounting location for under-slung stabilizers, and additional space for body compartments. The strength of the torque box shall be a minimum 19 million-inch pounds resistance to bending moment. The stabilizers and turntable supports shall be welded directly to the torque box.

Stabilization

The unit shall be equipped with two sets of extendable crisscross under-slung stabilizers. The stabilizers shall have a spread of 15'-6" centerline to centerline of the stabilizer pads when fully extended. One set of stabilizers shall be mounted in the forward body area and a second set close to the rear axle to minimize impact on departure angle.

The stabilizers shall have a tip over safety margin of 1-1/2 times the rated load imposed by the aerial in any position the aerial device can be placed as outlined in NFPA 1901 19.21.2. The apparatus stabilization shall be accomplished without the assistance of the chassis suspension or tires in contact with the ground.

The aerial shall be able to sustain a 1-1/3 to 1 rated load on a 5 degree slope downward in the position most likely to cause overturning as outlined in NFPA 1901 19.21.3. The maximum ground slope the apparatus can be set up on is 14 percent. On the 14 percent slope the apparatus can be leveled within a 6 percent operating range for the apparatus.

The cylinders shall be supplied with dual pilot-operated check valves on each stabilizer cylinder to hold the cylinder in the stowed or working position should a charged line be severed at any point in the hydraulic system. The stabilizers shall level side to side, corner to corner and front to rear on uneven terrain. Stabilizers shall contain safety lock valves. This assures there will be no "leak down" of stabilizer legs. Mechanical pins are not required. This feature contributes to efficient set-up and field operation.

The stabilizer lift cylinders shall be sized to maximize ground penetration. The lift cylinders shall be mounted on the side of the torque box for protection and shall have the following dimensions:

Bore: 7"
Stroke: 12-1/2"

The stabilizer extension cylinders shall have the following dimensions:

Bore: 2"
Stroke: 54-3/4"

Each stabilizer that can be extended from the body shall be supplied with a red warning light as outlined in NFPA 19.21.4.4. A stabilizer extended warning light shall be supplied in the cab to warn the driver of an extended stabilizer condition as outlined in NFPA 1901 13.11. A floodlight shall be supplied in each stabilizer location to illuminate the stabilizer and ground. The light shall automatically turn on with the deployment of a stabilizer.

The stabilizer ground contact area for each foot pad shall be 10" x 14" without auxiliary pads and 26" x 26" with auxiliary pads deployed. The ground pressure shall not exceed 75 psi with auxiliary pads deployed when the apparatus is fully loaded and the aerial device is carrying its rated capacity in every position. This shall be accomplished with the stabilizer pads deployed, as outlined in NFPA 19.21.4.2.

Stabilizer Controls

Eight (8) electric solenoid valves shall control the stabilizers. The control switches shall be located at the rear of the apparatus so the operator may observe the stabilizers during deployment. An audible alarm with a minimum 87 dbA shall also sound while the stabilizers are in motion as required by NFPA 19.21.4.1. Stabilizer deployment shall be completed in less than 45 seconds.

There shall be an interlock that prevents the operation of the ladder until the stabilizers are down and properly set as outlined in NFPA 19.17.5. Four (4) micro-switches, one (1) on each jackleg, shall sense when all four (4) jack feet are in contact with the ground. This condition shall be indicated when all four (4) yellow jacks-down indicator lights are on and the green interlock light is on. When the apparatus has been leveled, a manual transfer switch shall be used to shift hydraulic power to ladder operations. The interlock system shall have a manual override with access through a door on the rear control panel.

To simplify leveling the apparatus, two (2) color-coded level indicators shall be supplied at the rear of the apparatus. One (1) indicator shall be for front to rear level and one (1) for side to side level.

Forward Aerial Support

The aerial ladder support shall be fabricated from steel components and be welded directly to the torque box chassis. The ladder support uprights shall be constructed from 7/8" thick steel plate. Bolt-in diagonal bracing shall be installed on the support structure in an "X" pattern to restrict to side movement. This design shall allow for a pre-determined amount of flex preventing premature failure that can be found in an overly rigid structure. The support shall be located behind the rear wall of the cab.

Turntable Support Assembly

The aerial ladder turntable assembly shall be mounted at the rear of the apparatus. The turntable support assembly shall be welded to the integral torque box for efficient transfer of aerial loads to the stabilizers and shall permit storage of ground ladders in the center rear of the apparatus. The complete turntable support assembly shall be multi-pass welded to the sides of the combination chassis frame torque box.

The turntable support assembly shall be a steel weldment constructed of four (4) vertical 1/2" x 6" x 6" square tubes with 1/2" x 5" x 5" square tubes welded around the top ends of the verticals.

A bearing mounting plate shall be welded to the top of the verticals and sides of the horizontals. The bearing mounting plate shall be 55-5/8" x 55-5/8" and shall have a 1-1/2" thickness. This

bearing mounting plate shall be bulk-headed to a 3/4" steel plate that is welded to the bottoms of the horizontal tubing. The use of multi-pass welding shall be utilized wherever possible. A 46-1/2" pitch diameter rotation bearing with a 3" face drive gear shall be bolted to the top of the bearing mounting plate with thirty (30) 7/8" grade 8 plated bolts. The gear tooth shall be involute stub tooth form.

Upper Turntable

The upper turntable assembly shall attach to the rotation bearing and the base of the ladder. The turntable platform shall be a one-piece flanged steel plate that is a minimum of 96" in diameter and 3/8" thick. The working platform shall be covered with a non-skid material for operator safety.

Three (3) railings 42" high shall be provided along the outside of the turntable disc as outlined in NFPA 1901 19.18.1. There shall be a control pedestal on the left side of the turntable.

Two (2) padded Fire Research brand ManSaver safety bars shall be mounted to the turntable handrails. The bars shall lift up and inward (towards the ladder) permitting easy entrance to the ladder and control console.

The turntable assembly shall provide a mounting base for the ladder and elevating cylinders. The turntable assembly shall be bolted to the turntable bearing by thirty (30) 7/8" grade 8 plated bolts.

The ladder pivot point shall connect to the upper turntable assembly by two (2) 3" high strength pivot pins in heavy wall composite Teflon-lined bearings.

Elevation Mechanism

The aerial shall utilize dual 7" diameter elevating cylinders and shall attach to the upper turntable assembly and the base section of the ladder by 3" ID spherical bearings. The elevation system shall be designed following NFPA 1901 19.10.3. The elevation hydraulic cylinders shall be electronically controlled to come to a smooth, controlled stop at each end of travel. The elevation cylinders shall incorporate integral load holding valves which shall prevent aerial movement in the case of ruptured hydraulic lines to the cylinders. The hydraulic elevation cylinders shall also serve as a locking device to hold the aerial in the stored position for road travel.

Rotation Mechanism

The aerial shall be supplied with a hydraulically-powered rotation system as outlined in NFPA 1901 19.10.3. The two (2) high-torque hydraulic rotation motors shall provide continuous rotation under all rated conditions and be supplied with a spring-applied brake to prevent unintentional rotation. The high torque rotation drives shall operate through a dual reduction planetary gear box that drives a spur gear mated with the ring gear on the rotation bearing. The rotation gearboxes shall be rated at 120,000 in. lbs. each.

Aerial Electric Power

A hydraulic swivel shall be installed to provide hydraulic fluid transfer to the aerial ladder cylinders, electrical power to the aerial ladder, and water delivery to the pre-plumbed waterway while permitting continuous 360-degree rotation.

The swivel shall provide three (3) hydraulic circuits, twenty eight (28) electrical circuits, and one (1) 4" passage for water flow. Nine (9) of the electrical circuits shall be CAN bus capable. The swivel shall also be equipped with a rotary encoder to provide aerial position data to the microprocessor based control system.

The swivel shall be environmentally-sealed to prevent contamination of the hydraulic fluid.

Elevating Platform Water Delivery System

A 1250 GPM pre-piped waterway shall be supplied as outlined in NFPA 1901 19.12. The waterway shall telescope to the end of the third section to the platform water system. A waterway of 4'' internal diameter shall run through the turntable and a swivel joint to connect to the tubular aerial waterway. The tubular waterway shall run under the aerial ladder. The waterway tubes shall have the following sizes:

Base Section: 5'' OD

2nd Section: 4-1/2'' OD

Fly Section: 4'' OD

The tubes shall be constructed of 6063T6 anodized aluminum and shall be telescopic with the aerial ladder through sealed slip joints. The fly section waterway tubes shall be hard coated for wear resistance. The slip joints shall be designed with grease zerk fittings to facilitate lubrication.

A 1-1/2'' drain valve shall be installed and operated from the rear of the apparatus.

The water system shall be capable of flowing 1250 GPM at 100 PSI nozzle pressure at full elevation and extension. The friction loss between the tip and below the swivel shall not exceed 100 PSI while flowing 1000 GPM as outlined in NFPA 1901 19.12.1 and 19.12.2.

Waterway Relief Valve

An automatic relief valve preset at 250 PSI shall be installed in the aerial waterway to prevent over-pressurization of waterway system as outlined in NFPA 1901 19.12.8. The relief valve shall be mounted in the lower portion of the waterway where it enters the aerial torque box frame and dumps under the apparatus.

ISO Compliance

The manufacturer shall operate a Quality Management System meeting the requirements of ISO 9001:2000.

The International Organization for Standardization (ISO) is a recognized world leader in establishing and maintaining stringent manufacturing standards and values. The manufacturer's certificate of compliance affirms that these principles form the basis for a quality system that unswervingly controls design, manufacture, installation, and service.

The manufacturer's quality systems shall consist of, but not be limited to, all written quality procedures (aka QOP) and other procedures referenced within the pages of the manufacturer's Quality Manual, as well as all Work Instructions, Workmanship Standards, and Calibration Administration that directly or indirectly impacts products or processes. In addition, all apparatus assembly processes shall be documented for traceability and reference. The manufacturer shall also engage the services of a certified third party for testing purposes where required.

If the manufacturer operates more than one manufacturing facility each facility must be ISO certified.

By virtue of its ISO compliance the manufacturer shall provide an apparatus that is built to exacting standards, meets the customer's expectations, and satisfies the customer's requirements. A copy of the manufacturer's certificate of ISO compliance for each manufacturing facility shall be provided with the bid.

The aerial shall have a maximum stabilizer spread of 15'-6'' from pin to pin with the stabilizers deployed to maximum extension. The aerial platform shall be rated to provide full operating capacities in up to 35 mph wind conditions.

Aerial Hydraulic Oil Level Gauge

A hydraulic oil level gauge shall be supplied for easy fluid level verification. The three-light system shall indicate full oil level with a green light, acceptable oil level with yellow light, and low oil level with a red light. The display shall be located next to aerial master panel.

Platform Console Cover

A hinged cover shall be supplied to protect the platform control console. The cover shall be constructed of swirl finish aluminum plate and include a grab handle on the front to allow easy opening / closing. A gas spring shall be installed to hold the cover in the open and closed positions.

1250 GPM Electric Monitor

The aerial platform shall come equipped with an Akron 3578 electrically controlled monitor with an Akromatic 5177 straight stream to fog nozzle.

The platform waterway monitor shall have a horizontal sweep of 180 degrees (90 degrees either side of center) and a vertical sweep of 90 degrees (45 degrees above and below horizontal).

The monitor relay box shall include solid state components and be coated to resist corrosion. The monitor shall have fully enclosed motors and gears with built in manual override capability and quick attach handles. The monitor shall be able to operate in the horizontal and vertical axis simultaneously.

Control switches for horizontal movement, vertical movement and pattern selection shall be located at the base of the platform at the turntable console.

The electric monitor and nozzle shall be capable of discharging 250-1250 gpm at 80 psi nozzle pressure.

The monitor shall be installed on the center front of the platform.

Monitor Tip Controls

In addition to the controls at the operator console, electric monitor directional and stream controls shall be installed in close proximity to the monitor on the ladder.

Platform Monitor Valve

A 4" inline butterfly valve shall be installed in the platform piping directly below the monitor.

The valve shall be controlled from inside the platform by a handwheel. The valve shall be of the slow closing type to prevent sudden pressure spikes.

Monitor Finish

The aerial monitor(s) shall be painted job color.

LED Outrigger Lights (4)

Four (4) Truck-Lite model 91 LED outrigger warning lights with red lenses shall be provided. The lights shall be surface mounted on the outrigger covers in compliance with current NFPA 1901.

Warning Lights on Front of Platform

Four (4) Whelen 600 Series Super LED light heads with RED diodes and red lenses shall be provided. The rectangular flashing lights shall be surface mounted low across the aerial platform and be wired to the upper level warning light package.

Warning Lights on Sides of Platform

The aerial platform shall be supplied with two (2) Whelen 600 Super LED warning lights.

The LED lights shall activate with aerial master switch.

The lenses shall be Red and be located the side of ground pad brackets.

Ladder Base Lighting

Two (2) Whelen round 12 Super LED model PFBP12C floodlights with black housing and chrome rear cover shall be mounted one on each side at the bottom of the ladder base section.

They shall be controlled from the turntable operating pedestal.

Quartz Light

Havis, Inc. Whelen Pioneer Plus, model KR-14PFP2AC 150W 120V LED light fixture(s) shall be supplied. The rectangular extruded light fixture with die cast end caps shall measure 14" wide by 4-5/8" high by 3" deep and have a white powder coat finish. The light fixture shall have a dual panel (4) clusters of LED lamps with molded vacuum metalized reflector that draws 1.25 amps and produces 11,000 usable lumens. The light shall be mounted on a Kwik-Raze model 1400 permanent mount.

A weather-resistant switch shall be provided on the platform control panel to control the light when the aerial power circuit is activated.

The light shall be located right rear of platform facing down.

LED Flood Light

Havis, Inc. Whelen Pioneer Plus, model KR-14PFP2AC 150W 120V LED light fixture(s) shall be supplied. The rectangular extruded light fixture with die cast end caps shall measure 14" wide by 4-5/8" high by 3" deep and have a white powder coat finish. The light fixture shall have a dual panel (4) clusters of LED lamps with molded vacuum metalized reflector that draws 1.25 amps and produces 11,000 usable lumens. The light shall be mounted on a Kwik-Raze model 200 top raising aluminum telescopic pole with up indicator switch. The light shall be fitted with a weather-resistant switch and hard-wired to the aerial tip power circuit. The pole shall allow for 360-degree rotation of the light. A locking knob shall hold the pole at the desired height.

The light shall be located left rear of platform, right rear of platform.

Whelen Pioneer 120V LED Flood Light

A Whelen Pioneer Plus series 120V flood light model KR-SB-6PFP2AC 120V LED light fixture(s) shall be provided on a ROM Kwik-Raze model 600 permanent mount non-telescoping base.. The rectangular extruded light fixture with die cast end caps shall measure 14" wide by 4-5/8" high by 3" deep and have a white powder coat finish. The light fixture shall have a dual panel (4) clusters of LED lamps with molded vacuum metalized reflector that draws 1.25 amps and produce 11,000 usable lumens.

The light assembly shall be mounted at the tip of the aerial as specified. The base shall allow for 360-degree rotation of the light. A locking knob shall hold the pole at the desired angle. The light shall be fitted with a weather-resistant switch to control the light when the aerial power circuit is activated.

Location: left side front of platform.

Tip Flood Light

A 12V Whelen model PFBP12C LED flood light with switch shall be provided on the tip of the aerial device. The light shall be located right side front of platform.

Ladder Climbing Lights

A Luma-Bar Pathfinder LED lighting system shall be provided to illuminate the climbing area inside each ladder section. The strip type lights shall be located above ladder rung level and directed toward the centerline of the ladder to reduce glare. The lights shall be mounted to a 1.25" x .5" x .125" extruded aluminum channel and wired to not be an obstruction during climbing. The lights shall be controlled with the ladder lights switch at the operator's control console.

The LED lights shall be Blue (base) / Amber (2nd) / Red (fly).

Platform Preconnect

One (1) 2-1/2" discharge with an Akron 2-1/2" Pyrolite™ valve shall be located at the left rear of platform.

Waterway Inlet

One (1) 4" inlet shall be provided at the rear of the apparatus and shall be connected to the vertical pedestal waterway piping to supply water to the aerial waterway from an outside source. All fabricated piping shall be constructed of a minimum of Schedule 10 stainless steel piping to help prevent corrosion. The threads shall be NST. The inlet shall terminate with 5 inch stotrz thread and cap.

Reducing Elbow for Aerial Discharge

One (1) 2-1/2" FNST x 2-1/2" MNST 45 degree chrome elbow shall be provided. One (1) 2-1/2" FNST x 1-1/2" MNST reducer shall be provided on the elbow. The elbow shall include a 1-1/2" chrome cap and chain. This shall allow the use of 2-1/2" or 1-1/2" hose from the platform / ladder tip outlet.

Waterway Pressure Gauge

One (1) Class 1 weatherproof 2-1/2" compound vacuum pressure gauge with a range of 30-0-400 shall be installed adjacent to the waterway inlet. The function of the gauge is to advise the aerial operator of the pressure within the waterway. The gauge shall be filled with a liquid solution.

Aerial Tip Receptacle

A 110 volt twist lock 15 amp receptacle outlet shall be installed at the tip of the aerial device and wired into an apparatus breaker box with a 30 amp breaker. The breaker shall be fitted with a GFI protection feature. The receptacle box shall be fitted with a weather resistant cover.

Aerial Information System

The aerial device shall be equipped with an electronic system that displays critical information to the aerial operator for added safety. The system shall consist of a turntable mounted display, platform mounted display, two (2) electronic control modules, sensors and an interface harness. Information shall be conveyed to the operator through five (5) mission-specific screens, each tailored for a specific fireground activity. The screens display shall include available tip load, distributed load, master stream, aerial systems data and engine information.

The available tip load screen shall feature simple "Stick-Figure" type symbols that represent the allowable quantity of people at the tip. The screen layout shall be uncluttered allowing the symbols to be easily read at a glance. Systems that rely on hydraulic pressure to determine load shall not be acceptable.

In addition to available tip load, the system shall display the following information:

- Ladder extension (%)
- Ladder inclination
- Distributed load
- Waterway flow
- Waterway pressure
- Tip temperature
- Base temperature
- Hydraulic oil pressure
- Hydraulic oil temperature
- Aerial hourmeter
- Rung alignment
- Cradle alignment
- Breathing air status (if equipped with breathing air)
- Engine coolant temperature
- Engine oil pressure

- Battery voltage
- Engine speed

Audible Warnings

The system shall include alarms to indicate when breathing air is below 20% volume, tip temperature is greater than 300°F and hydraulic oil temperature is above 190°F.

Visual Warnings

In addition to the audible warnings, the system shall include visual warning indicators for low breathing air, high tip temperature and high hydraulic oil temperature.

Display Screens

- 5.6" Quarter VGA Transflective LCD screen with glass lens
- LED backlighting
- Environmentally-hardened housing
- Five (5) function buttons with three (3) color LED backlighting
- Five (5) navigation buttons

Electronic Control Modules

- Environmentally-sealed aluminum housing
- 40 MHz processor
- 448kB flash ROM
- 282kB SRAM
- 8kB EEPROM

Sensors

- Ladder extension
- Ladder inclination
- Waterway pressure
- Waterway flow
- Water presence
- Tip temperature
- Base temperature
- Hydraulic oil pressure
- Hydraulic oil temperature
- Cradle alignment
- Rung alignment
- Breathing air pressure (If equipped with breathing air)

Wiring harness

Wiring shall be individually and permanently function- and color-coded every three (3) inches on the insulation. The insulation shall meet SAE standard J1128 in its latest edition for GXL or SXL temperature rating. All exposed wiring shall be run in a loom with a minimum 289 degree Fahrenheit rating. All wiring looms shall be properly supported and attached along the entire run.

Durability

The components shall be thoroughly tested and have a proven reliability in severe environments to ensure long life on the fireground. The system shall be capable of operating in a temperature range of -40°F through 185°F.

The display and processor shall remain operational through the following tests:

- Humidity Tolerance - Component shall operate properly during and after an eight hour cycle in a humidity chamber at 115% of nominal system voltage and 90% relative humidity from its maximum operating temperature to -40°F and back to maximum temperature.
- Salt Spray - Component to function correctly at 115% of nominal system voltage while being subjected to a 5% salt spray for 48 hours at 100° F.
- Vibration - 8g random from 24-2000Hz.
- Moisture Leakage - Components must be sealed to +/-5 psi against water and water vapor.
- Destructive over voltage - Component must not fail in an unacceptable condition when subjected to 180 volts DC for eight hours at maximum operating temperature.

Diagnostics

The system shall detect faults through routine self-diagnostics. These checks shall be carried out on power-up, power-down and during operation. A fault validation technique shall be used to ensure that a fault has been present for a period of time before being declared detected. Each possible fault or event shall be identified and displayed by a unique diagnostic code, which shall be accessible through the service menu on the system display.

Aerial Platform Breathing Air System

The aerial device shall be supplied with a breathing air system as outlined in NFPA 1901 19.7.7 and section 24.5. The air system shall hold a total of 888 cubic feet of air carried in two (2) DOT 444 cubic foot cylinder rated at 4500 psi. The air tank shall be painted yellow and marked with a label that read "High Pressure 4500 psi Breathing Air". The tank shall be mounted in accordance with NFPA 1901 24.5.7 and include a guard to protect the valve on the cylinder end.

All components of the piping system shall have a 3 to 1 safety margin. There shall be a high pressure regulator supplied at the base of the aerial to reduce the air pressure to no more than 125 psi up the aerial. All valves fittings and hoses shall be constructed of corrosion-resistant material. A pressure relief valve set at 1 1/2 times working pressure shall be supplied to relieve the air lines in the event of a pressure regulator failure. Two (2) 1/4" NPT outlets shall be provided in the platform for dealer/customer installed quick-connects.

An air mask box shall be provided to store breathing air masks at the tip as outlined in NFPA 1901 19.7.7.4.

A low air breathing alarm shall be provided as outlined in NFPA 1901 section 19.7.7.5. The low air warning system shall provide an audible and visual warning when the air volume is at or below 20 percent.

Ground Fill Hose

A 50 ft. length of air hose for 4500 psi breathing air system with quick-connect fitting on each end shall be provided to permit the capability of filling air tanks without having to remove them from the aerial.

Axe Bracket

An axe bracket shall be provided on the aerial ladder. The bracket shall consist of a stainless steel bracket for the blade (with retaining pin), and chrome spring clamp for the handle. The bracket shall be designed to hold a 8 lb. axe.

Location: left side fly section.

Pike Pole Storage Tubes

There shall be two aluminum tubes mounted directly on the ladder for storage of an 8' and 6' pike pole or roof hook. The tubes shall be located right side fly section.

Lifting Eye / Tie-off Package

A lifting eye / tie-off package shall be provided on the aerial. The package shall consist of a pair of lifting eyes located one each side at the tip of the base section and a pair of tie-off points located one each side at the base of the aerial.

The lifting eyes shall be constructed of 6061T6 aluminum and be welded one each side to the tip of the aerial's base section. The hole in the eye shall have chamfered edges and be designed to allow attachment of 2" webbing. The lifting eyes shall have a capacity of 2000 lbs. each / 4000 lbs. total (with the aerial fully retracted and no personnel in the platform or on the ladder).

The tie-off points shall be constructed of structural steel and be welded to the aerial's upper turntable trunnions. The tie-offs shall be designed to allow attachment of 2" webbing. The tie-off points shall have a capacity of 375 lbs. each / 750 lbs. total.

Hose Box

A hinged covered hose box shall be mounted at the platform. The box shall have sufficient capacity to hold 50' of 2-1/2" double jacket coupled fire hose and pistol type automatic nozzle. The box shall be located left side of platform.

Litter Storage Box

A box shall be provided on the aerial ladder base section for storage of a basket litter. The box shall be constructed of welded aluminum extrusions and formed plate. The box shall be located on the right side ahead of the sign plate. The box shall hold a Traverse Advantage Litter

Roof Ladder Brackets

Two lift-out style roof ladder mounting bracket shall be installed on the outside of the ladder base sections. The bracket shall be designed to hold a 16 foot and 20 foot on the side of base section.

Aerial Sign Plate

Two (2) 12" x 144" x 1/8" (0.125") thick smooth aluminum plates shall be provided. The plates shall have 1" lips top and bottom for rigidity. Each sign plate shall be bolted on either side of the base section, approximately at the midpoint. The plates shall be provided to display the department's name or other information. The plates shall be painted FLNA4145 Black as specified by the customer.

Third-Party Flow Test

A flow test shall be conducted to determine that the water system is capable of flowing 1,000 gpm at 100 psi nozzle pressure with the aerial device at full extension and elevation. When the aerial apparatus is equipped with a fire pump, the test shall be conducted using the onboard pump. Intake pressure for the onboard pump shall not exceed 20 psi.

In addition to the flow test, a hydrostatic test shall be done on the waterway system. The permanent water system, piping, and monitor shall be hydrostatically tested at the maximum operating pressure required to flow 1,000 gpm at 100 psi nozzle pressure at maximum elevation and extension.

These results shall be certified by an independent, third-party testing organization, per NFPA 16.13.1 through 16.13.1.3.

Aerial Certification

All certification shall be performed by a certification organization that is accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, General criteria for the operation of various types of bodies performing inspection or ISO/IEC Guide 65, General requirements for bodies operating product certification systems.

All quality control testing shall be performed by an ASNT-certified level II Non-Destructive Test Technician. The aerial ladder shall be tested in compliance with the current editions of

NFPA 1901 and NFPA 1911. All sub-assemblies are to be inspected before assembly and body mounting.

Each aerial section shall be tested prior to the assembly of the complete aerial device. Each section shall be subjected to a visual weld inspection to assure the integrity of the weldment. Die penetrant shall be used as required to qualify suspected weld defect indications. All turntable mounting bolts, cylinder anchor pins, outrigger anchor pins, aerial hinge pins, and other critical mounting components are subjected to ultrasonic testing to detect any flaws.

A magnetic particle test shall be conducted on the torque box, aerial support structure, outriggers, outrigger support structure and all other structural ferrous aerial components. This test shall be performed to assure the integrity of the weldment.

After the aerial is assembled and installed on the vehicle, an operational inspection shall be made and the aerial shall be tested to comply with the applicable standards in the current editions of NFPA 1901 and NFPA 1911.

In addition to the above tests, the aerial shall successfully complete the following operational tests:

- 1) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial shall lift a test weight equal to the rated tip load capacity, as specified herein, with the aerial at full extension, 0 degrees elevation, and rotated 90 degrees to either side of the truck chassis. The test weight shall be lifted from 0 degrees to 15-20 degrees. The test weight shall be suspended from a position equal to the position of the outermost rung of the fly section or the center of the platform when so equipped. The aerial shall lift the test weight smoothly and evenly with no twisting or jerking. This test shall be performed at the normal hydraulic system relief valve setting. No temporary adjustments to the relief valve shall be allowed.
- 2) The completed apparatus shall be placed on a firm, level surface with the aerial ladder stabilizers extended and down. A test weight equal to 1.5 times the aerial's rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated a full 360 degrees around the vehicle with the aerial at full extension and at 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition.
- 3) The completed apparatus shall be placed on a firm surface having a minimum 5 degrees side slope with the aerial stabilizers extended and down. A test weight equal to 1.5 times the aerial's rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated 90 degrees to the downhill side with the aerial at full extension, 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability, and all of the stabilizers shall remain firmly on the ground. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition.
- 4) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. A test weight equal to 2.0 times the aerial's rated tip load capacity, shall be

suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position at full extension and at 8 degrees elevation (or high enough to clear vehicle-mounted equipment). After ten (10) minutes, the weight shall be removed, and the aerial shall be inspected for any abnormal twist or deflection.

5) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial will be positioned at full extension at 0 degrees elevation at some position out of the travel rest and off the side or rear of the truck. For units without a pre-piped waterway to the tip, a test weight of 220# shall be applied horizontally and perpendicular to the tip of the aerial at the location of the outermost rung. The rotation brake shall not release nor shall the aerial's deflection exceed the manufacturer's accepted tolerances. For aerials with pre-piped waterways, a test weight of 350# will be applied at the location of water nozzle. Upon satisfactory completion of all inspections and tests, an independent third-party inspection firm shall submit a certificate indicating that all specified standards have been met.

Wheel Chocks

Two (2) Zico non folding wheel chocks for up to 44" diameter tires shall be supplied and located per the customer. The holder shall be installed per customer location

DOT Required Drive Away Kit

Three (3) triangular warning reflectors with carrying case shall be supplied to satisfy the DOT requirement.

Paint Break with Dip to Grille

The cab shall have a two-tone paint break. The break line shall be approximately 31.5 inches below the cab roof drip rail. The paint break shall include a dip down to the corners of the cab grille.

Paint Chassis Frame Rails

Chassis frame rails, springs, cross-members, fire pump, drivelines, fuel and air tanks, axles, front bumper extensions with brackets and front suction piping (if applicable) shall be painted: FLNA3225E-1 Red.

Paint Custom Cab

The apparatus cab shall be painted Sikkens FLNA3225E-1 Red. The paint process shall meet or exceed current state regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil. Contractor shall, upon demand, provide evidence that the manufacturing facility is in compliance with State EPA rules and regulations. The aluminum cab exterior shall have no mounted components prior to painting to assure full coverage of metal treatments and paint to the exterior surfaces. Cab doors and any hinged smooth-plate compartment doors shall be painted separately to assure proper paint coverage on cab, door jambs and door edges.

Paint process shall feature Sikkens high solid LV products and be performed in the following steps:

- Corrosion Prevention - all aluminum surfaces shall be pre-treated with the Alodine 5700 conversion coating to provide superior corrosion resistance and excellent adhesion of the base coat.
- Sikkens Sealer/Primer LV - acrylic urethane sealer/primer shall be applied to guarantee excellent gloss hold-out, chip resistance and a uniform base color.

- Sikkens High Solid LVBT650 (Base coat) - a lead-free, chromate-free high solid acrylic urethane base coat shall be applied, providing excellent coverage and durability. A minimum of two (2) coats shall be applied.
- Sikkens High Solid LVBT650 (Clear coat) - high solid LV clear coat shall be applied as the final step in order to ensure full gloss and color retention and durability. A minimum of two (2) coats shall be applied.

Any location where aluminum is penetrated after painting, for the purpose of mounting steps, hand rails, doors, lights, or other specified components shall be treated at the point of penetration with a corrosion inhibiting pre-treatment (ECK Corrosion Control). The pre-treatment shall be applied to the aluminum sheet metal or aluminum extrusions in all locations where the aluminum has been penetrated. All hardware used in mounting steps, hand rails, doors, lights, or other specified components shall be individually treated with the corrosion inhibiting pre-treatment. After the paint process is complete, the gloss rating of the unit shall be tested with a 20 degree gloss meter. Coating thickness shall be measured with a digital MIL gauge and the orange peel with a digital wave scan device.

Paint Cab Two-Tone Color

The upper section of the cab shall be painted FLNA4145 Black.

The paint process of the secondary cab color shall be the same as the primary color.

Paint Body Large

The apparatus body shall be painted Sikkens FLNA3225E-1 Red. The paint process shall meet or exceed current state regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil. Contractor shall, upon demand, provide evidence that the manufacturing facility is in compliance with State EPA rules and regulations. The aluminum body exterior shall have no mounted components prior to painting to assure full coverage of metal treatments and paint to the exterior surfaces of the body. Any vertically or horizontally hinged smooth-plate compartment doors shall be painted separately to assure proper paint coverage on body, door jambs and door edges.

Paint process shall feature Sikkens high solid LV products and be performed in the following steps:

- Corrosion Prevention - all aluminum surfaces shall be pre-treated with the Alodine 5700 conversion coating to provide superior corrosion resistance and excellent adhesion of the base coat.
- Sikkens Sealer/Primer LV - acrylic urethane sealer/primer shall be applied to guarantee excellent gloss hold-out, chip resistance and a uniform base color.
- Sikkens High Solid LVBT650 (Base coat) - a lead-free, chromate-free high solid acrylic urethane base coat shall be applied, providing excellent coverage and durability. A minimum of two (2) coats shall be applied.
- Sikkens High Solid LVBT650 (Clear coat) - high solid LV clear coat shall be applied as the final step in order to ensure full gloss and color retention and durability. A minimum of two (2) coats shall be applied.

Any location where aluminum is penetrated after painting, for the purpose of mounting steps, hand rails, doors, lights, or other specified components shall be treated at the point of penetration with a corrosion inhibiting pre-treatment (ECK Corrosion Control). The pre-treatment shall be applied to the aluminum sheet metal or aluminum extrusions in all locations where the aluminum has been penetrated. All hardware used in mounting steps, hand rails, doors, lights, or other specified components shall be individually treated with the corrosion inhibiting pre-treatment.

After the paint process is complete, the gloss rating of the unit shall be tested with a 20 degree gloss meter. Coating thickness shall be measured with a digital MIL gauge and the orange peel with a digital wave scan device.

Aerial Paint

The lift cylinders, extension cylinders and upper turntable steelwork (less turntable) shall be painted to match the upper "two-tone" cab color.

Air Conditioning Condenser(s)

The air conditioning condenser(s) mounted on the roof of the cab shall be painted color: FLNA4145 Black.

Cab Interior Color

The interior of the cab shall be painted Zolatone gray 20-64.

Reflective Tape on Jacks

The four outriggers that protrude beyond the side of the body shall be striped with white reflective tape. The tape shall be visible from the front or rear of the unit.

Striping

A 6" NFPA compliant scotchlite stripe with 1" stripe above/below shall be applied per Fire Department design.

Lettering

Up to one hundred (100) scotchlite letters with shade/outline shall be applied per Fire Department design.

Reflective Stripe in Rubrail

The reflective stripe in the body rubrail shall be black.

Standard 1 Year Warranty

The apparatus manufacturer shall provide a full 1-year standard warranty. All components manufactured by the apparatus manufacturer shall be covered against defects in materials or workmanship for a 1-year period. All components covered by separate suppliers such as engines, transmissions, tires, and batteries shall maintain the warranty as provided by the component supplier. A copy of the warranty document shall be provided with the proposal.

Lifetime Frame Warranty

The apparatus manufacturer shall provide a full lifetime frame warranty. This warranty shall cover all apparatus manufacturer designed frame, frame members, and cross-members against defects in materials or workmanship for the lifetime of the covered apparatus. A copy of the warranty document shall be provided with the proposal. Frame warranties that do not cover cross-members for the life of the vehicle shall not be acceptable.

10 Year/100,000 Mile Structural Warranty

The apparatus manufacturer shall provide a comprehensive 10 year/100,000 mile structural warranty. This warranty shall cover all structural components of the cab and/or body manufactured by the apparatus manufacturer against defects in materials or workmanship for 10 years or 100,000 miles, whichever occurs first. Excluded from this warranty are all hardware, mechanical items, electrical items, or paint finishes. A copy of the warranty document shall be provided with the proposal.

20 Year Aerial Device Structural Warranty

The aerial manufacturer shall provide a 20 year structural integrity warranty on the aerial device. This warranty shall cover structural components and shall be extended for a period of 20 years after the date on which the vehicle is delivered to the original purchaser. A copy of the warranty

document shall be provided with the proposal. Please refer to warranty document for complete details and exclusions.

10 Year Paint and Corrosion Warranty

The apparatus manufacturer shall provide a 10-year limited paint and corrosion perforation warranty. This warranty shall cover paint peeling, cracking, blistering, and corrosion provided the vehicle is used in a normal and reasonable manner.

The paint shall be prorated for 10 years as follows:

Topcoat & Appearance:	Coating System, Adhesion & Corrosion:
Gloss, Color Retention, Cracking	Includes Dissimilar metal corrosion, Flaking, Blistering, Bubbling

0 to 72 months	100%	0 to 36 months	100%
73 to 120 months	50%	37 to 84 months	50%
		85 to 120 months	25%

Corrosion perforation shall be covered 100% for 10 years. Corrosion perforation is defined as complete penetration through the exterior metal of the apparatus.

The warranty period shall begin upon delivery of the apparatus to the original user-purchaser. A copy of the warranty document shall be provided with the proposal.

Misc. Additional Equipment

On Spot automatic tire chains

Mounting allowance for dept. supplied equipment - \$12,000

Shelf/tray allowance - \$10,000

Mount (4) dept. supplied radios